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EDITORIAL NOTES.

Good Working and Trading in South London.

"TIME continues to strengthen the bond of co-partnership "between the Company and its employees." These are the final words of the half-yearly report which Mr. Charles Carpenter, D.Sc., signs on behalf of the Directors of the South Metropolitan Gas Company, and which it will be his pleasure to present to the proprietors to-morrow. The pleasure will be of a character the antithesis of that with which the Directors appeared before the proprietors at the end of the half of 1912 that included the great coal strike, and a period of strenuousness and anxiety for them for many years unparalleled. The pleasure will be further intensified by the fact that the Company have come out of the half year with a small balance to add to the carry-forward, notwithstanding the still higher charge for coal—an increase which, the Directors say, "cannot be attributed either to legisla- "tive requirements or to the wages paid to miners, but to "the great demand for export coal, which has enhanced the "cost to the British user." This statement does not alone reflect the whole truth; the truth being that these various causes have placed in the hands of the colliery owners the power to inflict upon coal users an arbitrary increase of profit to themselves altogether beyond what is justifiable. However, the Directors and proprietors, notwithstanding the hostile factors of the half year, have good ground for mutual congratulation; and in this congratulation must mingle the ring of the words with which this article commences: "Time continues to strengthen the bond of co- "partnership between the Company and its employees." As the several items of the accounts are examined, together with the working and trading results, we can, even without the advantage of the internal knowledge possessed by the Chairman and his colleagues and the officers of the Company, detect the hearty co-operation that there has been between Directors, officers, and employees to diminish the effects of the drag of external events. Gas undertakings would rather be without these external trammels; but, forsooth, it must be said that the hard lessons and the experiences of the present will not be without their good effects in the higher standards for working that they are setting for normal times. We talk much of the vitality of the gas industry as though there was no personal element to be taken into account. If we talked a little more of the vitality and fertility of the men of the gas industry, we should be placing a good proportion of the credit on its proper pedestal.

The reviewer of the accounts on this occasion is placed somewhat at a disadvantage in making comparisons, through the abnormal conditions of the strike half of last year; seeing that the Directors estimated that the coal strike cost the Company some £14,000 in excess of the amount the Official Auditor certified as being the proper sum with which the insurance fund should be debited in respect of the extra cost occasioned to the Company by the nationally calamitous occurrence. But at the same time, the comparison that can be made gives all the information that is really desired to show that a good part has been done by the staff and the employees in suppressing the ill-effects of the higher price of coal. Coal cost £443,726, or £27,021 in excess of the sum charged to revenue account in the strike half of 1912. But the amount of coal carbonized (568,226 tons) was 14,611 tons in excess of the corresponding half year. The amount of gas made was 6,997,352,000 cubic feet, or 201,467,000 cubic feet greater than the amount produced in the first half of 1912. The make is equal to 12,314 cubic feet per ton, or an average of 39 cubic feet per ton of coal more than was made in the first half of last year. Now if the yield of gas had remained at the average of 12,275 cubic feet per ton, as in the period with which comparison is made, from the coal used last half year 22,160,814 cubic feet less gas would have been produced than was actually the case, and 1800 tons more coal would have had to be used to make up the deficiency. There was a time when some gas engineers would have said: "True; but there would have been "the extra quantity of residuals for the market, the receipts "for which would have gone to diminish the value of the "extra quantity of coal." Admitted; but to-day the residuals markets do not suggest that it is politic to increase their supply at the expense of a large sale of gas per ton of coal Now when we see that in the six months 14,611 tons of coal extra were handled in the Company's retort-houses, that 201,467,000 cubic feet of gas more were made, and that the carbonization wages (amounting to £48,646) were down by £666 compared with the corresponding half year, and lower by £2764 compared with the previous half, when 9152 tons less coal were carbonized, we think the claim is vindicated that the employees have contributed by good working to suppressing the ill-effects of the costly coal. Not only is this true of the manufacturing department, but the sales department can point to a consumption of gas amounting to 6,729,361,000 cubic feet, which is an advance of 105,516,000 cubic feet—the percentage increase having been 1·59.

However, the more these accounts are examined, the more it is felt that the employees of the Company have worked their hardest to prevent the heavier cost of coal interfering with the existing financial relations between consumers, proprietors, and co-partners, and that there has been success. It is not, of course, meant that the success is wholly due to them; that would be far from the truth. But by their working they have undeniably contributed to it. On the other hand, we have the manufacturing expenses, totalling to £641,296, showing an increase of £2486. Coal it has been seen cost £27,021 more, with 14,611 tons extra carbonized. But purification, in costing £22,033, is down by £8134, despite the additional volume of gas that had to be dealt with. Salaries increased by £1884; carbonizing wages were less (as already said) by £666; and the item of repairs and maintenance of works, costing £108,492, was lower by £17,620. The net result is the one previously shown—that manufacturing charges only came to £2486 more, despite the higher cost of coal, the increased quantity of coal carbonized, and the additional amount of gas made during the half year.

The reduced item for purification is interesting. Twelve months ago, the Chairman drew attention to the expenditure that was proceeding in developing the new process of raising the purity of the gas supplied, by converting by heat a large proportion of the carbon bisulphide to sulphuretted hydrogen, and removing it by the simple oxide of iron process. It was then stated that the advantage of the expenditure on purification plant would be gained in the near future. We hope it may be said that the reduction in purification costs is at least partly traceable to this expenditure, as well as the additional purity of the gas. The new process is going to be applied to all the gas produced by the Company, and then, by comparison, we shall learn more of it. Meantime, the Directors report (confirming the information in Mr. Carpenter's recent paper before the Société Technique du Gaz) that "the working of the new sulphur "removal apparatus has been satisfactory. The erection "of plant on the same principle, but more simple, and less "costly in construction, has been commenced at the East "Greenwich works." This fact speaks volumes.

There is not much else to be said concerning the expenditure side of the revenue account. There is an additional sum of nearly £3000 charged under co-partnership. Distribution expenditure (£178,238) is less by £6516; while in the charge for rents, rates, and taxes, there is an addition of £4363. The superannuation, sick, and accident fund charge (£15,086) exhibits a reduction of £2467; but the National Insurance Act is responsible for a charge of £3604. Summing up the expenditure, it amounts to £973,392, which is only in

excess by £3757 of the disbursements for the June half year of 1912 (allowing in the latter for the abnormal outlay due to the coal strike, and transferred to the insurance fund). This is excellent.

On the other side of the account, it is found that the money value of the 1·59 per cent. increase in gas consumption is £12,335—the total income from this source having been £716,467. This is an increase in sales upon a 2·6 per cent. advance in the June half of last year. But it is somewhat curious how gas consumption nowadays reflects more and more the erratic moods of our climate. Of the total receipts for private consumption (£699,176), £400,208 was received in the Ladyday quarter; this being no less than £2813 below the receipts in the same period of 1912. But in the June quarter, the £298,968 collected represented an augmented income of £14,834. So that the loss of the first quarter was recouped, with £12,021 to the good. The income from public lighting was £17,290; being an increase of £314. There were many days during the second quarter that were gloomy, and when atmospheric temperature could not boast of any particular geniality compatible with the time of the year. The reasons, however, spread beyond this. Connections are increasing in the households of South London consumers. The meter, stove, fire, and fittings rentals show this. The total receipt of £125,964 under this combined heading is £5879 in excess of the first half of 1912. The contribution of meters to the increase was £762; of gas stoves and fires, £2021; of gas-fittings, £3095. The Company have now 302,610 (ordinary and slot) stoves in use in their area—the increase in the ordinary stoves compared with twelve months since having been 1355, and in slot stoves 6260. Inasmuch as there are 362,125 meters fixed, there are still a good many places in the area in which a cooker must eventually find a home and a useful career. The number of gas-fires on hire looks somewhat insignificant against the forgoing figures—38,659, which number is an enlargement by 5379 on that of twelve months since. But gas-fires on hire, it is well to mention for the information of our critical competitors, afford no criterion of the number in use; for so many consumers prefer to buy their gas-fires outright.

In the residuals department, the position is interesting in view of the fact that this is an all-coal-gas Company. The total income from this source was £338,568, or £34,565 more, all of which was contributed by coke and tar and tar products. Coke, as a matter of fact, realized £205,709, which was £25,947 greater than the income from it in the first half of 1912. The Company did well; for they sold 21,428 tons less than in the first half of last year, and, of course, made more. The close of the half year saw the Company with a stock of 20,876 tons, which is 11,203 tons more than the quantity with which the half year commenced, and about 5000 tons more than at the end of June, 1912. Tar and tar products supplemented the Company's income by £14,179; but the income from sulphate of ammonia receded by £4599, and that from breeze by £962.

The final result is that with an income of £1,182,514, the Company have a gain of £52,665 on the first half of last year. The disbursements of the half year being only £3757 above those of the first half of last year, the carry-forward of £209,121 is greater by £48,908. The full dividend (under the sliding-scale) of £5 9s. 4d. per cent. is to be paid; and the undivided balance is, as previously remarked, enlarged by the sum of £1206. We heartily congratulate the Company.

Interesting Developments at Tottenham.

The development of the Tottenham and Edmonton Gas Company has of late years been proceeding at such a remarkable rate that there has been more than normal interest in it; and we should shortly arrive at a point when the title by which the undertaking has been known will (if there has been no change made in the Bill since it was introduced) cease, and a new one will be established, which will indicate the proper range of primary functions of the Company as light, heat, and power suppliers. The Bill, which was at the end of last week merely awaiting Royal Assent, will mean quite a change in the life and interests of the Company; for, by the measure, they largely extend their area by taking over the potentially fertile Enfield district, and are constituted, in addition to being the gas suppliers, the electricity purveyors to Wood Green. Already steps have been taken to give effect to the powers conferred by the Act; and it is abundantly evident, from the statement made by Sir Corbet Woodall at the recent meeting of proprietors, that the Engineer (Mr. A. E. Broadberry) and the technical staff must not look for any repose for some time to come from the structural work that development of interests and business demands. The Company are in an excellent position for meeting their new obligations. Their capital per million cubic feet of gas sold is down to £380; and the Directors have decided to reduce the price of gas in the old district to 2s. per 1000 cubic feet as from Christmas next, making the price the lowest but one in the region of London, while the presently-to-be-annexed areas are going to benefit substantially by lower charges. The last reduction made by the Company in the existing area was largely more than compensated by the 8·29 per cent. increase of gas business shown by the past half-year's report. As Sir Corbet says, the Directors and the proprietors can face the future with an easy mind, and that future will contain new and interesting conditions.

The Calorific Standard.

In the Act of the South Suburban Gas Company of last session, a calorific value standard was substituted for the illuminating power one; and it applies to the gas distributed in all but a comparatively small part of their area. In the accounts for the past half year, the make of gas is shown to have reached the average of 13,060 cubic feet per ton of coal carbonized. On this result, the Engineer (Mr. S. Y. Shoubridge) and his staff must be complimented, as they were most cordially by the Chairman (Mr. Charles Hunt) and the proprietors at the meeting on Friday. The application of the calorific standard and the high make per ton of the half year may not have any direct relationship; but the association by sequence suggests the point that Parliament, local authorities, and the public should do all in their power to facilitate the passing of the old standard, and the setting-up of the new. Had it not been for the, generally speaking, higher average gas makes per ton of the present than obtained aforetimes, consumers would have found themselves, with the current cost of coal, in very different case from that now enjoyed. It would have been impossible, despite the excellent conditions that have been prevailing, and still partly prevail, in the residuals markets, to have kept the prices of gas at the current levels. It matters not to the consumers, so long as the calorific power is right, that the illuminating power of the gas is not quite what it was in the days of lower average make; and the sooner the public are instructed as to the despotic power of the illuminating standard in preventing that freedom in manufacture which can produce something to set against the higher costs of coal, the better. Its deposition will be the best possible thing for the gas industry; and by what has happened in Parliament the past two sessions, the way has been definitely opened up for a quick revolution in the matter of the substitution of the old standard.

In his address to the proprietors of the South Suburban Gas Company, Mr. Hunt made a suggestion in regard to the calorific standard; and it comes opportunely. It is that "a combined endeavour should be made by the gas industry "(before it is too late) to secure something like uniformity "of legislative provisions, both in form and substance, so as "to avoid if possible the confusion which to this day exists "as to illuminating power, owing to the multiplicity of stan-"dards. That the time is already ripe for some such effort, "seems to be abundantly clear." These words are worth particular emphasis and prominence at the present time, as, despite all the effort that we have made, and successful it has been, there is at least one case this session in which there has been a departure from what is considered to be the most rational form of calorific clause that has found place in the British Statute Book. The two earliest forms of statutory clauses refer to calories in conjunction with cubic feet, and one of them deals with net values, and has complicated conditions attaching. The South Suburban clause, on the other hand, deals with British thermal units in conjunction with cubic feet, and with gross value instead of net. This is the form of clause (we do not say always in respect of quantities) that will be most useful in the British gas industry for comparative purposes—more especially in the matter of gross value, which is favoured by not only the major part of expert opinion in this country, but by America and Germany, with France at the moment more favourable to the net value. To adopt a form of clause that will be taken as a model is a matter that should be

well considered before next session, when at any rate the Gaslight and Coke Company will be asking Parliament for relief from the thraldom of two qualitative standards, and for the right to work to the only sensible and appropriate one—calorific value. At the same time, it is hoped that—if there is not before then a combined agreement as suggested by Mr. Hunt—the Gaslight and Coke Company will get the terms of their present clauses revised to B.Th.U. and gross value, with a simplification of conditions. The accord of the London County Council with the South Suburban clauses suggests that there will be no difficulty in this regard.

It must be recognized that what the Gaslight Company do in this matter will have an important influence upon the future; and therefore it is not only the question of this Company's interests, but those of other concerns that have to be considered. The great thing is that, in this matter of the terms of the calorific clauses, the gas industry wants to get to the bedrock of simplicity, and to something like uniformity, so as not to repeat the difficulties in connection with a calorific value standard that have obtained, as Mr. Hunt points out, in connection with the illuminating power standard.

American Silica Material.

We are in a position when, among technical subjects, the refractory materials question, as a controversial one, may almost be said to be again in a state of flux; but perhaps gas engineers are expecting too much, at too early a stage, to issue from the more or less tentative specifications of the Refractory Materials Committee. It has been made quite plain by the Committee that they want their work to be regarded as the starting-point from which the revision indicated by experience may be applied to the working up to a better state of things in respect of refractory products. The Committee realize the great importance of the subject; and they are not going to relax their efforts in the attempt to arrive at a pronounced success. For their work, it may be said that it has created as much interest as, if not more than, that of any Committee of the Institution who have dealt with a subject on the manufacturing side; and we quite hope to see their labours rewarded by definite and valuable issues. While keeping an eye on what they are doing, we shall also watch with interest any development that may take place in America. It is understood that there will be a report presented at the next meeting of the American Gas Institute on progress in carbonization methods; and there is hope that, as an outcome of the report, our American colleagues will also appoint a Committee to consider the general question of refractory materials. If this comes to pass, the independent working of the two Committees cannot fail to be of mutual assistance. Of course, it may be that those gas engineers who are now asking for material that will stand higher temperatures may find that, with the adoption of calorific power as the standard quality for gas, the trend of things may lead in time to the use of lower temperatures, the production of a higher grade gas, and the use of blue water gas. But this course is a prospective and hypothetical matter, and not a present one. And, looking at the past, higher temperatures are not the only consideration in the matter of the production of first-class refractory materials, witness to which is found in the discontent expressed in the initial part of the controversy.

American gas engineers have suffered much the same difficulties in regard to their refractory materials as have gas engineers in this country; and they are keenly hoping that their experiences with silica material will afford a positive measure of relief. The information available in this country as to what is being done in America in this regard has been spasmodic, small in amount, and somewhat inconclusive. But piece by piece we are getting together the tale as to what has been and is being done there; and eventually we hope to have the whole story as to experiences and details of working. The material is being employed not only in connection with coke-oven practice, but in gas-works. The most detailed information yet to hand is found in a pamphlet issued by the Improved Equipment Company, of New York, obtained through the kindness of Mr. H. Russell, the Superintendent of Gas Manufacture of the Rochester Railway and Light Company, of which enterprise Mr. R. M. Searle is one of the Vice-Presidents. Mr. Searle, with Herr E. Körting, it will be remembered, directed attention, at the recent meeting of the Institution of Gas Engineers, to the use of silica material in America. The pamphlet before us tells of the character of the American material, and of the process followed in its working up. This is all good so far as it goes; but we want the information to go farther, and supply us with working experiences and records. The material that our American friends are using is silica, 96 per cent. pure, manufactured from ganister rock. Its chemical purity is stated to be dependable; and its physical properties—such as heat resistance, conductivity, and porosity—are not subject to variations. The ganister is finely crushed into small, sharp, irregular particles, and, with a small percentage of a chemical binder, it merges under pressure into a solid uniform mass, and is burned in kilns in moulds. It is quite clear from the description that considerable care is exercised in the manufacture of the material.

The Company upon whose pamphlet we have drawn for the information supplied in the article in other columns are confident that they have secured the right material for the purpose of high-temperature carbonization; and they acknowledge the bountifulness of Nature in the provision of the material. What is wanted in these times are retort-settings which will carbonize the largest amount of coal per twenty-four hours, and which will give the maximum yield of gas, with the lowest consumption of fuel. This is the simple economic truth of the position. To get these results, the heat must be conducted to and into the charges in the shortest possible time; and this, of course, depends upon the conductivity of the retort material. If the heat gets to its work quickly, it follows that the productive capacity of a retort must be increased; and the ratios of capital, space, and fuel used to the work done must be improved. In the pamphlet, it is asserted that the silica material "conducts "heat 50 per cent. better than clay; it will withstand a "higher temperature than fire clay available for this use; "and its porosity is less and more uniform than clay." Combined with these good features that make for economy, it is reported that the physical qualities of the material enable it to withstand all the ordinary usage to which retorts and settings are exposed. We shall be glad to have the present information supplemented in the manner already indicated.

Incandescent Gaslight the Nearest Approach to Daylight.

In the matter of scientific acknowledgment, the quality of incandescent gaslight is now receiving its due. For several years, we have, whenever opportunity offered, "pegged-in" a claim for the quality or composition of incandescent gaslight being more in consonance with normal daylight than that of any other source of artificial illumination. Those who have made a scientific study of the subject have come to the same indisputable determination; and the gas industry can now, in the commercial competition, give the best of authority for their claim in regard to quality of light. Our own conclusions in the matter were based on simple spectrum tests; but in the "Journal" for Oct. 21 last, there came confirmation from Mr. T. Thorne Baker, F.C.S., F.R.P.S., and again, in last week's number, from Dr. H. E. Ives, through the article sent by Mr. R. ffrench Pierce (p. 366). Two better authorities could not be named. Both have come to the same opinion, while manufacturers who have to deal with colours have been arriving at like results by more empirical means. But in discarding the electric light for incandescent gas-light on the ground of the better ability to match colours by the aid of the latter than by the former, they have been following lines which both Dr. Ives and Mr. Thorne Baker say, from research and experience, are absolutely correct.

Manufacturers, artists, and others require a light by which they can match colours with the same confidence as by daylight. Scientists who have been engaged in producing the means for providing such a light have worked along the lines of producing filters or screens for the purpose of absorbing any excess in the artificial light of different colours above the proportion in which they are found in daylight. But the strange thing is that for a long time these scientists apparently devoted all their energies to the utilization of incandescent electric lamps, and produced screens or filters for them alone. Difficulties were experienced. Different electric-lamps required different screens; and, after these were provided, it was found that the spectrum composition of the light varied with age and with changes of voltage, so that no reliance could be placed on

the "artificial daylight." Working separately and at different times, both Dr. Ives and Mr. Thorne Baker have found this defect; and further they have independently arrived at the conclusion that the incandescent gas mantle supplies the greatest uniformity in the matter of the composition of light throughout its life, and that it is a much nearer approach to daylight than any other artificial incandescent light source. This being so, we are brought to yet another consideration. The farther the spectrum composition recedes from daylight, the greater must be the necessary absorption to produce the artificial daylight; the nearer to daylight the spectrum composition of the light from an artificial source, the less the requisite amount of absorption. To get perfection, naturally the absorption of the excess of undesirable rays means loss of light, with some depreciation of the volume of light from the desirable rays. In the case of the incandescent gas-mantle, Dr. Ives finds about 80 per cent. of the light requires filtering to bring the remainder to daylight composition; while with other forms of light sources (the spectrum composition being farther removed from daylight), a greater proportion of the light must be absorbed or wasted. Therefore, the nearer the spectrum composition is to daylight, the simpler becomes the problem of absorption or filtration.

Because of the fact that the composition of incandescent gaslight is nearer daylight than that of any other source of illumination, because the filtered light is more economically produced, because it is not subject to variations in light composition the same as is the case with incandescent electric-lamps, manufacturers and others who work in colours are strongly recommended to adopt gaslight, as being most suited to their purpose. Therefore the managements of gas undertakings in their commercial literature can state, if they have not already done so, that the composition quality of incandescent gaslight more nearly approaches daylight than that of any electric incandescent source, and, in doing so, can quote the authority of Dr. Ives and Mr. Thorne Baker. This should be of immense use in their campaign among shopkeepers and manufacturers in whose business and work colour plays an important part.

A Hint from the Other Side.

In the course of an editorial in the "Electrical Review" this week, incidental reference is made to the National Gas Exhibition. Having mentioned the coming event, these sentences follow: "We will add nothing further at this stage save a hint that October should be a month of greatly increased commercial activity on the part of all electric supply authorities in and around the Metropolis. Were the Electric Supply Publicity Committee not listless, it might have given an energetic lead. But as matters stand, nobody would dream of looking that way for leadership. Apparently it lies in a comatose condition! We must all help ourselves—unless we are to look to the 'Point-Fives.'" We are much obliged to the "Electrical Review" for the hint. To be forewarned is to be forearmed. Two can play at the game of "increased commercial activity." The gas industry will watch during the autumn for the symptoms of increased liveliness on the part of their electrical competitors—and the gas industry will act accordingly.

Free Appliance Results at Glasgow.

The report and statement of accounts and working of the Glasgow Corporation Gas Department, for the year ended May 31 last, is the most complete vindication of the forward policy adopted by Bailie Paxton, the Convener of the Gas Committee, and his colleagues, on the recommendation of their Engineer and General Manager (Mr. Alexander Wilson). In every department of gas supply, business is flourishing, and discloses day by day the enormous scope there is for the development of the gas industry. The quantity of gas sold and accounted for in Glasgow last year amounted to 7,070,833,972 cubic feet, representing an increase of 513,649,088 cubic feet, or 7·83 per cent. In view of the policy of allowing consumers the use of stoves and grills free of rent, the first effects of this are the most interesting features of the report. At the end of May last year, the number of stoves and grills on loan was 100,693, as compared with 145,142 at May 31 last—showing the large increase of 44,449. The department has had a very busy year in the district. This, of course, has meant a considerable expenditure, which was anticipated in considering the inauguration of the new policy. Again the adoption of the hire system for gas-fires, radiators, &c., has also resulted in a large increase of business. Up to June last year, hire-purchase was the vogue; and the number of gas-fires then in use through the department was 4599. At May 31 last, the number of gas-fires on hire was 12,589. In addition, during the year, 657 heating appliances were sold outright; and 1792 were supplied on hire-purchase terms. This large gas appliance installation in one year is the feature of the report; and, of course, the work having proceeded through the year, the full effect on consumption is not shown in the magnificent increase of business recorded—an increase which covers every department—domestic, power, and manufacturing consumption, both within and outside the city supply area. The figures quoted above are the best possible testimony to the citizens' appreciation of the forward policy of the department, and of the cheap supply of gas. For this forward policy and cheap supply, Glasgow is better than it would be otherwise, for every one of these gas-heating appliances means the displacement from service of a smoke producer and air defiler.

The Railway Time-Card Slander.

In the suburbs of London, it is the practice of certain of the coal merchants, at the beginning of each month, to distribute railway time-cards at the local railway stations. These are very useful cards; and, being preserved for at any rate a month by many constant travellers, they form a good mode of advertising the enterprising firm's commodity. At certain stations in the district of the South Suburban Gas Company, Messrs. Nathaniel Pegg and Co. have this month been distributing time-cards, at the bottom of the third page of which, in bold type, and always before the eye of the user of the card, are the words "Gas heating and cooking stoves are neither healthy nor economical." Similar time-cards have perhaps been distributed in other gas-supply areas; and this must not be permitted to go on without some move being made to deal with this offensive trade slander. On the face of the time-card, it is stated that "N. P. & Co., Ltd., do not hold themselves responsible for any damage suffered through errors in these time-tables, although every care is taken to ensure accuracy." There is one thing about which it is obvious they have not "taken every care to ensure accuracy," and that is the false statement as to gas heating and cooking stoves being neither healthy nor economical. Perhaps the statement as to the firm not holding themselves responsible for any damage suffered through errors in the time-tables only refers to the figures, and not to the deliberately traducing words to which attention is here called. The question of their responsibility for them is not one for them to solely determine. This is of a piece with the recent circularizing campaign, by the coal merchants, in London and the suburbs, through which attack was made upon the use of gas fires and cookers, which is an excellent testimony to the popularity of gas heating. This circular has been criticized in our columns; and the absurdity of the statements has been exposed. But still the coal merchants continue to send their mendacious literature through the letter-boxes of householders and users of gas fires and cookers. Nevertheless, we learn, from various districts, that the gas companies are allowing this sort of thing to proceed without taking any steps to controvert the false and harmful statements.

Motor Cars and Street Lights.

Motor cars and street-lamps appear to have assumed somewhat unfriendly relations, while their proper attitude one to the other should be the exact opposite. Motor cars have an unkind propensity for knocking down lamp-posts; and somewhat frequently motor-car owners accuse lamps of being extinguished, and causing accidents and damage. Claims result against the local suppliers of the lighting. The matter generally turns on the question of negligence—whether the damage was caused through the so-called "negligence" of (say) the local gas suppliers in not having the lamp alight. It is very difficult sometimes to get reliable evidence after an accident of this sort as to whether at the time of the collision, the lamp was or was not alight; seeing that the chances are that the lamp might be extinguished by the shock. It is not always that a person is present at the time of an accident who happens to pick up part of a broken lamp, and have to drop it again with alacrity on account of the heat, as was the case in a Clapham Common incident of this kind, which was before the Lambeth County Court last May. In that instance a motor car owner charged the South Metro-

politan Gas Company with negligence in not having a lamp alight with which the motor car had come into contact. The learned Judge held that there was every proof that the Company had not been negligent; and he also made the commonsense observation to the effect that the Company could not keep a custodian under every lamp during the lighting hours.

Contributory Negligence.

The car owner in the Clapham Common case did not get any satisfaction from the Court; nor did the owner of a car who recently brought an action against the South African Lighting Association, as reported in our "Legal Intelligence" to-day. In that case again, it was also a question of whether the Association had been guilty of negligence in not having a lamp alight. The evidence was conflicting; but its greatest weight was on the side of the Association. In this action, the point of contributory negligence weighed with the Judge. Though a street lamp may not be alight, it does not relieve the owner of a motor car from exercising proper management and control over the car. The fact that cars carry strong head-lights shows that the drivers do not rely entirely upon the street-lamps for safety and the prevention of accident. If they cannot depend upon these head-lights, then they might just as well not have them. With such lights and prudence combined, drivers of cars ought to be able to avoid collision with lamp-posts. If they cannot —— well, then the judgment of the South African Court is right, that they ought not to obtain damages from other people for the results. That is a commonsense view; and if common sense did not rule in such matters as this, the time might come when collisions between motor cars and lamp-posts might become a lucrative means of gaining a livelihood.

The Position of Nitrate.

When noticing last month the reports dealing with business in nitrate of soda during the first half of the present year, it was pointed out that the early hopes of those connected with the market had to some extent failed to materialize; and mention was made of a suggested scheme for the curtailment of the output of nitrate over the current six months. A further stage in the matter of this proposal was reached last week, when, at a meeting in Chili, a very large majority of the producers decided in favour of a temporary limitation of the output. Minor details have been left over for settlement at a subsequent meeting. In stating these facts, the "Financial Times" says it is estimated that the proposed reduction in output will result in a drop in production between now and January next to a little under 29 million quintals, whereas with an unrestricted output the figure would probably have been 31 million quintals. Taking the visible supply of nitrate in Europe at the end of June, together with the stocks in Chili, as 70,000 tons more than the corresponding figure last year, and the intended reduction in output at 35,000 tons, the result arrived at is that the supplies available next spring are not likely to be more than 35,000 tons in excess of the figure at the same date of this year, when consumption fell off heavily owing to causes which will be still remembered; and should the demand in the spring be equal to that two years ago, stocks will be reduced, which it is argued should have a stimulating effect on prices. In fact, it is mentioned by our contemporary that the outlook for the entire nitrate industry is now regarded in the trade as encouraging. The improved prices recently ruling are, it is said, being taken full advantage of by producers, and the average selling figure for the current year will in most cases show a material improvement over the corresponding figure for 1912, when forward sales had been made before the rise set in.

Unemployment Insurance.

A period of about nineteen months—from the passing of the Act in December, 1911, to the end of the first insurance year on July 12 last—is covered by the first report on the proceedings of the Board of Trade under Part II. of the National Insurance Act, which deals with unemployment insurance. This was issued last week as a Blue-Book, and contains much information regarding the working of the Act, though it must be remembered that, while the scheme has been in operation for a year, there has been only six months' experience of the payment of unemployment benefit. Further, some of the figures have not as yet been fully and finally analyzed. In a note to the report, Sir H. Llewellyn Smith, the Permanent Secretary to the Board of Trade, remarks that the number of unemployment books issued during the year in connection with the particular trades included in the scheme was slightly over 2½ million, which probably corresponds to a total number of 2¼ million workmen holding such books at a given time. Of these, less than one-fifth were previously insured against unemployment through voluntary associations. The income which is at present being received from employers' and workmen's contributions is at the rate of about £1,800,000 a year, or £2,400,000 including the State contribution. So far, the expenditure on benefits, refunds, and administration has been at the rate of about £700,000 per annum.

Early Experience.

In this connection, however, it is rightly pointed out that the period covered has been one of exceptionally good employment. As benefits have only been payable during one half of the year, a large surplus will be carried forward for use in future years, when, of course, employment may be less active. In fact, the invested balance of the unemployment fund already reaches £1,610,000. During the six months, the claims received and dealt with numbered some 560,000; and in a large proportion of the cases unemployment was of only short duration. It is claimed that the institution of compulsory insurance in the scheduled trades has not weakened, but, on the contrary, has strengthened, the tendency of workmen's associations to make voluntary provision for such insurance. Indeed, the main inferences to be drawn from the experience of the past year are, says the report, first, that compulsory State insurance against unemployment in specified trades appears to be administratively practicable; and, secondly, that such insurance can be introduced without destroying voluntary insurance. The real test of the scheme will, of course, come when the present industrial activity is followed by depression.

PERSONAL.

Acting on the recommendation of Mr. Baldwin Latham, their Engineer, the Bideford Town Council have appointed Mr. H. Chambers Bullen as Resident Engineer for the extension of the water-works.

In the list of prize winners at the last City and Guilds examinations, it will be seen that Mr. Tom Rudge, of Stafford, made an unusual record. In Grade I. of "Gas Engineering" he pulled off the second prize (£1 10s. and a bronze medal), and in Grade I. of "Gas Supply," he achieved the same result—second prize (£1 10s. and a bronze medal). We compliment Mr. Rudge on the "double event," as this certifies a good all-round technical knowledge. Mr. Rudge was a pupil of Mr. Hubert Pooley when he was at Stafford. Though Mr. Rudge was only with Mr. Pooley a few months before this gentleman took up the duties of Engineer and Manager to the Leicester Corporation Gas Department, the latter has since taken part in directing his studies, which have, as seen, been most successful.

As mentioned in the notice of the half-yearly report of the Directors of the Croydon Gas Company which appears elsewhere, they express very great regret in announcing that Mr. James W. Helps, after rendering most valuable services to the Company during a period of nearly thirty years, has felt himself obliged, for reasons of health, to relinquish his office of Engineer and General Manager; and they have granted him a suitable retiring allowance. To meet the situation thus caused, the Directors have appointed Mr. Archibald Caddick to the position of Engineer and Works Manager, and Mr. William James Sandeman to that of Distributing Engineer and Sales Manager. We are pleased to hear that Mr. Helps is feeling better, and that he is hoping, in his retirement from official service, that his association with the work of the gas industry will not altogether cease. In our opinion, and we are sure it will be the view of others, it would be a pity if so large a professional experience were allowed to lie altogether dormant, and not be made use of by gas undertakings, in an advisory or administrative capacity, when opportunity offers.

At the meeting of the Workington Town Council last Tuesday, Mr. Horace Chamberlain, Assistant Engineer and Manager at the Hull station of the British Gaslight Company, was appointed Gas Manager, in succession to Mr. E. G. Hutchinson, who, as already announced in the "Journal," has gone to Carlisle. Mr. Chamberlain is the youngest son of the late Mr. H. B. Chamberlain, formerly Secretary of the British Gaslight Company. He was educated at the Grocers' Company's School in London, and studied engineering and chemistry at the City of London College. He was appointed junior on the engineer's staff at the Potteries station of the Company in 1900, was transferred to Hull in 1903, and promoted to the position of Resident Engineer in 1909. He

has for the past four years been Lecturer on "Gas Engineering" and "Gas Supply" to the Hull Municipal Technical College. He holds First-Class Honours certificates of the City and Guilds of London Institute in both these subjects, as well as certificates in chemistry, &c. He commences with a salary of £250 per annum. Mr. Chamberlain is thirty-five years of age, and married.

The Directors of the Wrexham Gas Company have appointed Mr. OWEN EVANS Engineer and Manager, in succession to Mr. Joseph Braithwaite, whose death was announced recently in our columns. Mr. Evans has been in the service of the Company for nearly fifteen years, for the last five of which he acted as Assistant to Mr. Braithwaite, from whom he received his training—gaining considerable experience during the entire remodelling of the works and the carrying out of a big scheme of mains extensions. He received his technical education at Wrexham School of Science and Art and the Liverpool Central Technical School, winning a number of prizes at the former and the First Leigh Gregson Memorial Prize for highest success in technology at the latter. He also holds first class honours certificates in "Gas Engineering" and "Gas Supply," as well as certificates in Chemistry, Machine Construction and Drawing, Practical Geometry, Heat, and Heating and Ventilation. Mr. Evans has a large number of personal friends connected with the industry, who will heartily congratulate him on his success; for during the last four years he has been lecturer in "Gas Supply" at the Wrexham Science and Art Schools, and he is also a member of the Midland Junior Gas Association, at a meeting of which he some time since read a paper describing the sulphate of ammonia plant, with Claus sulphur-recovery apparatus, which is in operation at the Wrexham Gas-Works.

OBITUARY.

The death has just occurred at his residence, in Falkirk, after a short illness, of Mr. HENRY STARK, of Grangemouth. He was a town councillor shortly after Grangemouth was formed into a burgh, and was Chairman of the Grangemouth Gas Company for a number of years prior to the gas-works being acquired by the Corporation in 1906.

The death occurred on the 2nd inst., at the age of fifty-six, of Mr. THOMAS BATES, the Chairman of the Sudbury and Long Melford Gas Companies. Deceased was a solicitor, and had a large practice in Sudbury and Haverhill. The funeral last Wednesday was attended by Mr. C. G. Grimwood, the Engineer, Manager, and Secretary of the Sudbury Gas Company, as representing the Sudbury Town Council.

Mr. H. P. Maybury Appointed Road Board Engineer.

The announcement has been made of the appointment of Mr. Henry Percy Maybury, M.Inst.C.E., the County Surveyor of Kent, as Chief Engineer to the Road Board; Colonel Crompton, C.B., continuing to act as he has hitherto done as Consulting Engineer. Mr. Maybury will begin his new duties as soon as the County Council fill the vacancy thus created, which will probably be in the month of November next. The appointment calls for record in the "JOURNAL" from the fact that before Mr. Maybury entered the service of the Kent County Council, about nine years ago, he was Surveyor and Gas Manager to the Great Malvern Urban District Council. He joined the Gas Institute in 1897, and passed into the Institution, of which he is now a member. He has held an advisory position under the Road Board since its formation; and it is understood that his appointment to the office of Chief Engineer to that body is a preliminary to important developments in the policy of the Board in connection with road improvement and the construction of new roads. It may be remembered that towards the close of last year Mr. Maybury's salary was advanced by the County Council by £500 per annum, in order to get him to withdraw his candidature for another appointment.

Bending Cast-Iron Pipes.—Owing to an oversight, says the "Engineering Record," no curves or sleeves were ordered for a line of cast-iron pipe which it had been decided to lay to convey water from the Guayabo River to the town of Preston, Cuba. The cañon through which the pipe passes for a distance of about two miles from the dam is crooked, rendering impossible such easy curves as could be made in the pipe-joints. As it might have taken several months to secure additional special pipes, the local engineer decided to bend some of the straight cast-iron pipes. The Cuban workers had frequently bent steel or wrought-iron pipes at their sugar-mills, and they followed the same course of procedure with the cast-iron pipes, with entire success, as they did not break or spoil a single pipe. The pipes were bent to various radii—the shortest being 50 feet. A cradle of old rails was first constructed with the desired amount of curvature, and a fire of hardwood was built under and around the pipes. Six or eight pipes were bent at a time. In from one-and-a-half to two hours after starting the fires, the pipes were hot enough to bend and settle under their own weight on to the cradle prepared for them. They were 10 inches in diameter, with a 9-16th inch thick shell; their weight being about 760 lbs. per 12 feet length.

ELECTRICITY SUPPLY MEMORANDA.

IT was shown in the "Memoranda" last week that the North Metropolitan Electric Supply Company are not very happy over the proposal of the Acton District Council to adhere to their proposed specification for the lighting by electric lamps of the main thoroughfare, nor do they care about facing the penalties proposed for deficiency, unless the District Council will finance the Company for penalty purposes by paying a higher price per lamp. There is humour for onlookers in the attitude taken up by the Electric Supply Company. In the same issue of the "JOURNAL," there was a *résumé* of a report on street lighting specifications by a Committee of the National Electric Light Association of America; and they too are not at all disposed to concede street testing as the correct thing for ascertaining whether or not contract conditions are being observed. The Committee think it is all very well to study public illumination in all its aspects in the streets, so as to get the very best effects from the light sources. For example, the height and spacing of the lamps, and the character of the globes and reflectors used, should all be considered; and there should be investigation to see that uniformity of illumination is obtained, to ensure that there is an avoidance of glare, and to make certain that the colour of the light is what it should be. If some power could enforce all this being done in this country, then at least some people would be happy, and some would be very unhappy. Those in the latter category would be electrical engineers who desire to get candle-feet about a metre from the ground surface on a horizontal plane by using glare-promoting globes only slightly obscured at the base. The colour of street lights is a matter of importance. In putting up in the streets flame arc and other electric-lamps, there is little consideration paid by the street-lighting authorities to the colours of the goods displayed by shopkeepers. Perhaps the street-lighting authorities will take this into account now that scientists [see article in to-day's editorial columns] have subscribed their names to what has been long known by men of less position in the ranks of science, that the spectrum of incandescent gaslighting more nearly approaches that of daylight than does the spectrum of any electric lamp, and that the colour of the light does not suffer such variation. But about the testing to decide whether there is compliance with contractual obligations, the Committee of the National Electric Light Association of America think that sample street lamps should be taken down and tested in the laboratory. But the trouble is that those are not the conditions under which the contractor guarantees to give a certain light or illumination. The Committee have gone to one extreme; our own Joint Committee on Street Specifications, in proposing minimum illumination (a healthy work-producing scheme for illuminating engineers) have gone to the other extreme. The Westminster system of testing takes the middle course, though we are not such admirers of it that, if something better came along, we should obstinately reject the improvement. It does not seem that our electrical friends, who are not illuminating engineers but are contractors for street lighting, are altogether easy over this street-testing business—when the street-lighting authority is not the authority controlling the electric supply undertaking.

Street Lighting Specifications.

Cole on Gas-Fires.

The letter written by Mr. Ruthven Murray to "Electrical Industries" [as noticed last week] on the subject of cooking and heating and the 0·5d. charge per unit, has brought two letters—one from Mr. J. Horace Bowden, and the other from Mr. F. W. Cole—to our contemporary. Mr. Bowden seems to think that Mr. Ruthven Murray's position as a critic of the 0·5d. suppliers of current for cooking and heating is due to the fact that he is interested in electrical supply by a company, who have to keep an eye upon dividends, whereas a municipal engineer has only to supply the greatest number of units at the lowest possible price. Some of them are successfully doing this, to the end that there is a deficiency of profit, or the balances are so lean that they require to be examined through a magnifying-glass, and their accounts show a lamentable condition in the matter of reserves. In the concluding part of his letter, Mr. Bowden says that the normal profit on the sale of current at 5d. is 2d.; and he regrets that he has never yet been able to produce a balance-sheet showing a profit of 2d. on every unit sold. As he is selling many units at below 2d., this is not surprising; and therefore he condemns his own practice, and proves that the bulk of his profit comes from those who pay most dearly. Mr. Cole supplies a more interesting letter, in which he confirms Mr. Ruthven Murray's contentions. He thinks that the point the last-named gentleman makes, that the gas companies have built up a large cooking and heating business without cutting the rates, is an important factor for consideration. A point not mentioned by Mr. Ruthven Murray, but with which he would, of course, agree, is that the *crux* of this question of building-up a cooking supply is that of getting efficient apparatus. The success of the gas companies is, Mr. Cole says, undoubtedly due to the fact that no stone has been left unturned to bring their cooking apparatus up to a point of the highest efficiency as regards the minimum cost of use, purchase price, and a minimum margin for renewal expenses. He also thinks it

possible that where excessively low rates are quoted for electric cooking supply, the undertaking making a great point of such low rate for this use has no reasonable anticipation of a large supply being demanded at this figure, and, in fact, would be considerably perturbed if such demand showed any indication of a rapid growth. Where electricity supply undertakings, who have quoted these low rates, are doing a "large" business in cooking, it would, he urges, be interesting if some of them would give actual figures showing how their anticipations have turned out. We have suggested this before, but there has been no success in eliciting the information.

An Examination Paper.

The lofty criticism that Mr. A. Nichols Moore, of Newport, Mon., brought down upon himself by his charming audacity in questioning the legitimacy of the claims of the Point-Fives, has induced him to invite one of his critics—Mr. Horace Bowden, who is a Point-Five—to answer a series of questions as a means of testing the validity of the position taken up by those who in this matter of a tariff have thrown discretion to the winds, and have adopted something which they do not care to have examined too minutely. The questions that Mr. Moore has set for Mr. Horace Bowden to exercise himself upon are 26 in number; and they read like an examination paper. We doubt if Mr. Bowden will answer the whole of the questions; they are a bit too searching to be pleasant for a Point-Five. It is a topic that has never yet been openly discussed in all its financial bearings; and it is not likely to be in a way that will enable one to get to a position, on the evidence of the Point-Fives themselves, to judge whether or not they have built upon a rock or a foundation of shifting sand. Mr. Moore opens his interrogations by asking blandly, What is a Point-Five? Of course, the answer is any electrical engineer who drags a halfpenny into his tariffs, either standing alone or supplemented by any lump-sum that he can obtain. Some of the questions are directed to ascertaining whether the ½d. comprises a due regard for the future. The inquiry is also put: "Do all the members of the Point-Fives maintain that they can sell electrical energy at ½d. per unit, and make a profit by the sale of these units, after allowing for all legitimate and necessary charges?" Then comes the question: "What do you consider are legitimate and necessary charges?" Mr. Bowden is, among the other interrogations, asked to say whether he considers electrical energy at 1d. per unit equivalent to gas at 2s. 6d. per 1000 cubic feet when used for cooking and heating. If Mr. Bowden answers, we hope he will compare on the basis of the over-all use of the gas-oven. Then comes the awkward inquiry: "Would you be prepared to supply electricity for traction purposes at 0·5d. per unit?" Also uncomfortable is the inquiry: "If you charge a consumer 0·5d. for heating and cooking, do you consider it fair to charge him 5d. for lighting. Some of these questions are very much to the point; but we doubt whether Mr. Bowden will answer them all and fully. On some pretext, he will, we fancy, run away from certain of them. Mr. J. W. Beauchamp, of West Ham, at any rate would do so. In a letter, he says he thinks it is most unfair that those who have lead the way in this direction should be called upon to explain precisely the incidence of their working costs, and their reasons for adopting any particular tariff. We fail to see where the unfairness comes in. If there is sanity and soundness in the position, why not make disclosure? It is a sad confession when, in a matter of policy of this kind, a man is afraid to state his reasons and expose to criticism the fundamentals of his policy. If Mr. Moore's questions are answered and properly, we shall have at least further interest from the Point-Fives. [Since the foregoing was written, Mr. Bowden has sent to the "Electrician" replies to the questions. Some of them are merely evasive; some otherwise. We will notice them next week.]

Sceptic, or—What?

Mr. C. Orme Bastian has found an opportunity of publishing a short letter, in the "Electrical Times," upon the note that appeared in the "Memoranda" on July 1, in which we gave him information as to authorities of greater eminence than himself in the science of heat measurement, whereby he could have seen that his opinion is ill-founded that, of the heat generated by modern gas-fires, 80 per cent. is wafted up the chimney. Mr. Bastian now entirely evades the point, by stating that he has not the time to consult these authorities; and so we suppose he will pursue his blind course, and cling to his view——because it suits him. One of our references was to our columns as recently as June 10. It would not have taken Mr. Bastian long to look up that one. A still more recent one is July 22 (p. 234). There he will see the results of tests made by Mr. W. J. A. Butterfield, M.A., F.I.C., of two gas-fires, to ascertain the effect of using different lengths of flue-pipe. The first fire tested was an "Apollo"—a new fire, which does not require a flue-pipe, owing to the form of construction directing the products of combustion through the flue-vent to the chimney without the aid of such a pipe. In Table IV., it will be seen that (using a radiometer of a size which allowed some of the radiant heat to escape unmeasured at the sides and top) Mr. Butterfield reports that in the case of the "Apollo" fire "the proportion of the heat of gas rendered available for heating the room (total heat, less flue gas losses) was 76·37 per cent." Using various unnecessary lengths of flue-pipe on that fire, the percentage was reduced to about 60 per cent. The figures are also given for the other fire. Will Mr. Bastian say that Mr. Butterfield has erred, as well as the other authorities we have quoted? It is only fair now that Mr. Bastian should tell us, or the learned "Meteor" (who we know on his own admission has never made any heat tests on the lines of those to which we have referred him), where our authorities are wrong. Mr. Bastian declares that he has been assured by medical men that bronchial trouble is often attributable to the use of gas-fires in bedrooms. Strange thing, is it not, that there should be in the area supplied by the Gaslight and Coke Company nearly 4000 medical men who now use gas-fires in their own houses? Mr. Bastian's medical men must be some of the ancient order, who are unaware that the misconceptions of a past day regarding gas-fires have been swept away among up-to-date medical men, who, in this connection, are now laughing at their own past ignorance and fancies. Mr. Bastian confesses to having made some tests on gas-fires. He says: "The gas-fires on which I have made my tests are those which were supplied to me by the Gaslight and Coke Company, and which I retain in my house as a means of showing off the advantages of electric heaters by comparative tests." We have before asked Mr. Bastian to describe to us the conditions under which he made his tests, and the measuring instruments that he used, together with the figured results that he obtained. If he has not time to improve his knowledge by studying other people's work, he might let us have the benefit of more particulars about his own. At the same time, he might give us information as to the age and makes of the fires that he places in comparison with his modern electric-heaters. Such information might disclose where some of the difference is to be found between Mr. Bastian and ourselves, and where he may be inadvertently imposing upon those to whom he demonstrates.

Bad Effect of Shades.

An interesting point is raised in "Installation Topics" of the "Electrical Times" concerning the effect of the use of shades round incandescent electric-lamps. It is a very common practice with users of electric-lamps to get effect and toned-down lights by dressing up the aggressively glaring lamps in flimsy shades of the hobble skirt pattern, or closely fitting glass shades. The users have no consideration whatever for what the lamp thinks of this close confinement. The paragraph before us tells us that such tight-fitting costumes are a mistake, and anything but healthy for the lamps—that the lamps require a little breathing or ventilation space if long life is to be obtained. It is suggested that glass shades should have ventilating holes in them or the gallery to which they are fitted should not be solid, so as to allow the dissipation of heat between the lamp and the shade. With unventilated shades, pendants and brackets become unduly hot, and the life of the lamps is materially affected. The writer in our contemporary says he knows of one case where lamps so run blackened quickly, and broke down in little more than a month—the burning hours being about fourteen per day. This gives a life of less than 400 hours, allowing for Sundays off. This was due entirely to want of ventilation. For ventilation purposes in glass shades, narrow slots are found more effective than circular ones. The wire lamps give out a smaller amount of heat (using less energy for a given candle power) than when carbon filament lamps are employed; but they require a good deal of tender care and protection to enable them to render a fairly respectable life of service.

Pit Disasters.

The terrible disaster at one of the coal pits of the Carron Colliery Company, situated some three miles beyond Bishopsbrigg, will not do any good to the application of electrical energy in mines. Time after time we see the miners of the country alarmed through disasters which they believe are traceable to the fusion of electric cables in the collieries. In this case about 22 lives were lost. Some of the newspapers say that it is not known how the fire was started; others that the origin of the fire is purely a matter of conjecture; others that it was caused by the fusion of an electric wire. What is clear, from the statement of one of the survivors, is that a distance from where he and his comrades were working, a little smoke was first noticed; but, thinking this would pass away, it occasioned no immediate alarm. But soon after it was observed that the volume of smoke was increasing; and then the fire spread with remarkable rapidity. Fires always do where there is cable insulation to conduct it about. Perhaps something more definite as to the origin of the fire will be learned when full inquiry is made into the circumstances; but probably all trace of the originating cause has been wiped out through destruction by fire. Only last week, attention was directed to a case in which the Sheepbridge Coal and Iron Company were fined for an infraction of the Home Office rules in respect of earthing certain parts of the electrical system, and for leaving unprotected other live parts. The Home Office are minded not to have their regulations treated as of little account; and they were instrumental in bringing another Colliery Company to book last Saturday for ignoring some of their special rules in respect of earthing and protection. In this case, there were in all eighteen summonses; and the Company—the Measham Collieries, Limited—were fined £105, and costs amounting to £19 4s. There is evidently good reason for action on the part of the Home Office; and the activity will do good.

COMPARATIVE WORKING RESULTS OF THE LONDON AND FOUR SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED JUNE 30, 1913.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

——	Gaslight and Coke.	South Metropolitan.	Commercial.	Brentford.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	13,800,180	6,729,361	1,685,443	1,669,454	1,182,956	1,033,520	970,695
Increase . . . . . per cent.	3·23	1·59	1·35	7·46	8·87	4·35	8·29
Gas made per ton of coal . . . . cubic feet	12,220	12,314	13,195	12,011	12,616	12,712	12,901
„ „ per gallon of oil . . . . „	438	..	438	432	433	..	458
Gas unaccounted for . . . . . per cent.	7·43	2·49	5·88	4·92	5·09	4·36	4·68
Coke made for sale per ton of coal . cwt.	9·98	9·26	10·91	10·82	10·55	10·14	9 18
Tar made per ton of coal . . . . galls.	9·71	9·57	10·58	9·49	9·94	9·39	..
Liquor made per ton of coal . . . galls, 8 oz.	37·56	40·44	39·57	35·99	33·55	38·11	37·82
Percentage of coke used as fuel	20·56	24·96	12·69	13·48	15·58	22·28	24·17
Capital expended per 1000 cubic feet sold during the past year	s. d. 10 8·86	s. d. 7 11·59	s. d. 8 6·16	s. d. 7 2·99	s. d. 7 1·76	s. d. 9 11·20	s. d. 7 7·12
Price charged per 1000 cubic feet	2/6 to 3/- 2/2	2 2	2 4	2/5 & 2/4	1/9 to 2/10½	2/3 to 4/-	2 1
Costs per 1000 Cubic Feet of Gas Sold. REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	15·33	15·82	13·89	14·90	16·30	18·14	14·66
Less residuals—Coke and breeze	7·55	7·47	5·63	5·84	7·92	8·04	5·53
Tar	1·65	2·03	1·62	1·67	2·00	2·13	1·48
Amm. liq. and sulph. amm.	2·24	2·57	1·96	1·15	1·84	2·38	1·60
Total residuals . . .	11·44	12·07	9·21	8 66	11·76	12·55	8·61
Net for coals . . .	3·89	3·75	4·68	6·24	4·54	5·59	6·05
MANUFACTURE—							
Salaries	0·28	0·65	0·42	0·42	0·17	0·56	0·29
Wages—carbonizing	1·94	1·73	1·45	1·42	1·74	1·27	1·42
Purification	0·32	0·79	0·21	0·25	0·26	0·21	0·36
Repairs—plant	4·07	3·87	3·69	4·92	4·75	2·36	5·30†
Net manufacture . .	10·50	10·79	10·45	13·25	11·46	9·99	13·42
DISTRIBUTION—							
Wages and salaries	1·05	0·77	0·82	1·20	1·21	1·41	0·99
Repairs—Mains and services, &c.	1·66	1·56	1·31	2·60	3·59	2·46	3·81
„ Meters and prep. meters and fittings	1·86	2·46	2·14	0·98	1·21	3·06	1·51
„ Stoves—ordinary and prepayment .	1·56	1·57	1·61	1·43	1·95	1·79	1·10
Total net manufacture and distribution .	16·63	17·15	16·33	19·46	19·42	18·71	20·83
Public lamps—lighting and repairing	0·47	0·53	0·38	0·61	0·55	0·77	0·46
Rents, rates, and taxes	3·02	2·12	2·26	1·79	1·05	2·01	1·92
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	0·23	0·28	0·35	0·47	0·58	0·74	0·46
Collectors	0·47	0·59	0·70	0·55	0·48	0·53	0·48
Stationery and general charges	0·26	0·51	0·44	0·34	0·52	0·47	0·50
Profit-sharing	0·40	1·15	0·55	..	0·41	0·65	0·57
Bad debts	0·11	0·07	0·06	0·08	0·09	0·04	0·03
Law and parliamentary charges	0·04	0·06	0·05	0 02	0·05	0·03	0·19
Superannuations, &c.	0·47	0·54	0·32	0·43	0·39	0·66	0·12
National Insurance	0·07	0·13	0·07	0·07	0·09	..	0·07
Sundries	0·04	0·02	0·02	0·00	0·01	..	..
Total expenditure (*less* residuals) . . .	22·21	23·15	21·53	23·82	23·64	24·61	25·63
GAS	29·53	26·07	27·44	28·72	25·22	30·25	25·03
Rentals—Meters and prep. meters and fittings	2·68	3·22	2·71	3·33	2·72	2·21	1·90
Stove	1·17	1·27	1·64	0·94	1·96	1·50	3·97
Incand. mantle maintenance . . .	..	..	0·12	..	0·41	..	0·19
Miscellaneous	0·10	0·05	0·01	0·01	0·08	0·04	0·04
Total—Gas, rentals, &c.	33·48	30·61	31·92	33·00	30·39	34·00	31·13
Balance, being profit	11·27	7·46	10·39	9·18	6·75	9·39	5·50
Dividend and interest	10·47	7·42	9·18	7·21	6·53	8·80	5·43
Surplus	0·80	0·04	1·21	1·97	0·22	0·59	0·07
Contribution to funds	0·83*	..	..	..	..	..	..
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	15 5·14	15 7·42	15 3·87	..	16 6·06	18 1·88	16 10·37
Coke realized per ton of coal	7 9·02	7 2·88	8 5·90	8 2·58	8 6·50	7 9·18	7 4·56
Coke „ „ of coke	15 6·48	15 7·62	15 6·74	15 2·21	16 2·27	15 4·45	16 0·99
		Per Yard.				Per Yard.	Per Chal.
Breeze „ per ton	5 5·46	1 3·82	3 5·13	3 4·25	2 8·67	2 5·20	1 11·82
Tar realized per gallon	0 2·25	0 2·51	0 2·36	0 2·29	0 2·57	0 2·73	0 2·12
Amm. liquor, &c., realized per butt (8 oz.) . .	7 1·67	6 9·51	8 4·40	4 10·71	6 6·64	6 8·94	6 3·66
Percentage of stoves at rental to consumers . .	74	93	64	85	..	85	53
Bad debts per cent. on total receipts.	0·25	0·17	0·14	0·19	0·21	0·08	0·08
Net profit per cent. on ordinary capital . . .	5·43	5·54	6·25	16·52	6·56	6·36	5·62
One penny variation equals in half year . . .	£57,501	£28,039	£7023	£6956	£4929	£4306	£4045
Carb. water gas, per cent. on total make . . .	15·95	..	35·06	33·93	10·99	..	26·81

* Special purposes and redemption funds.

† Includes 0·49 to renewal fund.

North British Association of Gas Managers.—The annual meeting of this Association will take place in Greenock on the 4th and 5th prox., under the presidency of Mr. James Macleod, F.I.C., F.C.S., the Corporation Gas Engineer and Manager. We learn from him that the William Young Memorial Lecture will be delivered by Dr. W. B. Davidson, of Birmingham, who will take for his subject "Possible Economies in Gas Manufacture, with Special Reference to Liquid Ammonia." Papers on the following subjects will be submitted: "Notes on the Sale and Distribution Department," by Mr. R. Halkett, of Glasgow; "Developing the Sale of Gas and Income-Tax Depreciation," by Mr. J. B. Scott, of Cowdenbeath; and "Free Gas Appliances," by Mr. David Vass, of Perth. Further particulars of the arrangements for the meeting will be announced in due course.

COMPARATIVE WORKING RESULTS OF THE LONDON AND FOUR SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1912.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	Gaslight and Coke.	South Metropolitan.	Commercial.	Brentford.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	431,933	105,516	22,444	88,040	571,437*	289,991*	74,335
Increase (variation equal to) . . . per cent.	1·29	**1·01**	·12	**·13**	5·71	2·71	**2·07**
Gas made per ton of coal . . . . cubic feet	**381**	39	85	**400**	295	817	120
,, ,, per gallon of oil . . . . ,,	30	..	21	39	20	**402**	32
,, unaccounted for . . . . . per cent.	·32	1·23	·36	**·97**	·39	4·24	1·62
Coke made for sale per ton of coal . cwt.	·02	**·07**	**·26**	**·23**	·03	·05	**·24**
Tar made per ton of coal . . . . galls.	·01	·15	**·51**	..	1·29	**·61**	..
Liquor made per ton of coal . . . galls, 8 oz.	**·19**	·31	3·96	**2·36**	**1·40**	**2·14**	·33
Percentage of coke used as fuel	**·66**	·80	2·07	1·88	**·28**	10·62	2·65
Capital expended per 1000 cubic feet sold during the past year	s. d. **0 7·43**	s. d. **0 3·52**	s. d. **0 2·75**	s. d. **0 7·47**	s. d. 0 5·83	s. d. 1 11·87	s. d. **0 5·38**
Price charged per 1000 cubic feet	..	..	..	**0 1·00**	..	**0 1·00**	**0 1·00**
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	3·58	·72	2·37	·71	3·68	4·34	1·91
Less residuals—Coke and breeze . . .	1·56	·79	·79	·97	1·43	·01	·69
Tar	·34	·48	**·07**	·01	·38	·47	·02
Amm. liq. and sulph. amm .	·12	**·21**	·31	**·08**	·17	**·28**	·25
Total residuals . . .	2·02	1·06	1·03	·90	1·98	·20	·96
Net for coals . . .	1·56	**·34**	1·34	**·19**	1·70	4·14	·95
MANUFACTURE—							
Salaries	**·03**	·05	**·03**	·01	**·04**	**·06**	**·01**
Wages—carbonizing	·10	**·05**	**·11**	**·02**	**·34**	..	·10
Purification	·04	**·30**	**·04**	**·07**	·02	·16	·04
Repairs—plant	·15	**·70**	**1·04**	·72	**1·04**	**1·76**	·78
Net manufacture . .	1·82	**1·34**	·12	·45	·30	2·48	1·86
DISTRIBUTION—							
Wages and salaries.	**·03**	**·01**	·07	**·47**	·09	·16	·02
Repairs—Mains and services, &c. . . .	**·12**	**·08**		·11	1·88	1·01	**·28**
,, Meters and prep. meters and fittings	**·12**	**·38**	·02	**·60**	·10	·77	**·04**
,, Stoves—ordinary and prepayment .	**·02**	·14	·03	·26	·95	·61	·24
Total net manufacture and distribution .	1·53	**1·67**	·24	**·25**	3·32	5·03	1·80
Public lamps—lighting and repairing	**·03**	**·04**	..	**·22**	·02	·06	**·34**
Rents, rates, and taxes	**·02**	·12	**·07**	**·18**	..	·21	·32
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	**·02**	..	·01	**·04**	**·12**	·01	·07
Collectors	**·02**	..	**·01**	..	·06	**·02**	**·01**
Stationery and general charges	..	**·06**	**·05**	·06	·20	·07	..
Profit-sharing	**·01**	·09	·04	..	**·07**	·03	·05
Bad debts	**·01**	·01	..	**·01**	·06	..	..
Law and parliamentary charges	..	·01	**·01**	**·02**	**·30**	**·90**	·15
Superannuations, &c.	**·30**	**·10**	·06	·06	·23	**1·34**	·05
National Insurance	·07	·13	·07	·07	·09	..	·07
Sundries	**·01**	..	..	·00	..	..	..
Total expenditure (*less* residuals) . . .	1·18	**1·51**	·28	**·53**	3·49	3·15	2·16
GAS	·10	·02	·03	**·40**	3·86	1·87	**1·15**
Rentals—Meter and prep. meter and fittings	·14	·09	·02	·14	**·63**	1·25	**·04**
Stove	·07	·05	·06	·07	·80	**·05**	·36
Incand. mantle maintenance . . .	..	..	·01	..	·13	..	·02
Miscellaneous	..	**·01**	..	..	**·08**	·01	..
Total—Gas, rentals, &c.	·31	·15	·12	**·19**	4·08	3·08	**·81**
Balance, being profit	**·87**	1·66	**·16**	·34	·59	**·07**	**2·97**
Dividend and interest	**·32**	**·08**	**·17**	·17	·65	1·75	**·19**
Surplus	**·55**	1 74	·01	·17	**·06**	**1·82**	**2·78**
Contributions to funds	**·01**	..	..	..	..	..	**·27**
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	3 1·01	0 6·77	1 11·63	..	3 5·99	4 4·79	1 10·73
Coke realized per ton of coal	0 9·14	0 8·95	0 9·49	0 9·92	0 2·05	**0 6·87**	0 2·92
Coke ,, ,, of coke	1 6·12	1 8·62	1 9·30	1 9·77	0 3·24	**0 4·31**	0 11·06
		Per Yard.				Per Yard.	Per Chal.
Breeze ,, per ton	**0 0·86**	**0 1·98**	0 0·82	**0 4·34**	0 10·51	**0 3·39**	0 11·31
Tar realized per gallon	0 0·21	0 0·54	**0 0·17**	0 0·16	**0 0·06**	0 0·67	**0 0·11**
Amm. liquor, &c., realized per butt, 8 oz. .	**0 6·38**	**0 8·16**	0 0·60	**0 4 86**	**0 2·72**	**0 10·12**	0 5·81
Percentage of stoves at rental to consumers . .	..	2	1	..	..	**2**	7
Bad debts per cent. on total receipts	**·03**	·02	..	**·02**	·14	**·01**	..
Net profit per cent. on ordinary capital . . .	**·35**	1·53	·02	1·58	**·51**	**1·94**	**3·59**
One penny variation equals in half year . . .	£1800	£440	£94	£367	£2381	£1208	£310
Carb. water gas per cent. on total make . . .	**7·78**	..	**3·75**	**3·57**	**15·59**	**7·86**	**5·44**

* These figures represent the variation on the absorbing Companies' own figures, and not on those of the amalgamating Companies, whereas in the preceding table the increase on the "Gas Sold" is on the amalgamated figures.

In connection with the forthcoming National Gas Congress and Exhibition, there will be a conference of the British Commercial Gas Association, for holding which the Corporation of the City of London have granted the use of the Council Chamber at the Guildhall. The Lord Mayor will receive the members; and in the evening there will be a banquet.

A VISIT TO CURTIS'S AND HARVEY'S MANTLE WORKS.

SITUATED at Dartford, away from the hum and bustle of London life, and amid green fields and trees, giving an environment that makes work pleasant, is the gas-mantle factory of Curtis's and Harvey, Limited, of Cannon Street House, E.C., and on the same extensive site, with considerable open spaces on all sides, are the gun-cotton works of the same firm. To these dual factories (which by the way have a relationship in that the collodion required for stiffening mantles is, as is known to our readers, prepared from gun-cotton) the writer found his way a few days since; and there met, and was welcomed by, Mr. H. Hetherington, the Works Manager, who conducted him round the various departments, and showed him how mantle making is carried on by the firm, in the most modern of ways. Mantle making is an industry that has in its methods progressed with time; and here the firm, by ingenious machines of their own devising, have eliminated as far as possible the vagaries of the human factor in the processes that make for excellence in the finished mantle. The particular machines that they use in the vital part of the processes are distinctive of this factory. We know it is upon the detail of mantle production that everything depends; and in the uniformity of execution of detail must depend uniformity in the quality and performance of the resulting article. This is a condition that the managements of gas undertakings want. Experience has proved to them, especially in these days of lamp and burner maintenance, that the cheap mantle is not always cheap in the end. Lowness of first cost is very often obtained by an inattention to detail that means disuniformity, disappointment, and an injury to the reputation of gas. It is absurd to allow this. The technical staffs of gas undertakings are bestowing more rigorous control than ever over the work of gas production. They may produce gas of good calorific power and specific gravity; they may deliver it at a good pressure; and the sales departments may do their part in supplying burners that, with the gas, will provide a good flame temperature. But all the effort in these directions may be negatived in the final article necessary to illumination—that is to say, the mantle—if the mantle be of inferior make in any one or more particulars. Therefore, so far as lies within their power, the interest and duty of the managements of gas undertakings is to see that their customers obtain good mantles. Mr. Hetherington set out to prove to the writer—and he did it successfully—that Curtis's and Harvey, Limited, have equipped and ordered their works, with brains, machines, and a good class of worker, for the purpose of producing mantles that in service shall do their part in maintaining the reputation of gas.

SOME PRELIMINARY NOTES.

The firm's mantle factory is, as already indicated, capable of large extension; but at the present time the capacity of machines and workers is equal to about 50,000 mantles a day—mantles of all sizes, and of many sorts. Incidentally, it was learned that in these days, the production of, and the demand for, mantles of the upright and inverted types are about balanced; but the tendency is for the existing 50 per cent. of inverted mantles to increase, and reduce the percentage of output of the upright mantles. The "Ironclad" mantle is the firm's original and principal brand; and this is in both the knitted and woven varieties, and with either metal or asbestos tops as dictated by the fancy of the buyer. Then there is the "Ironclad Iris" for inverted

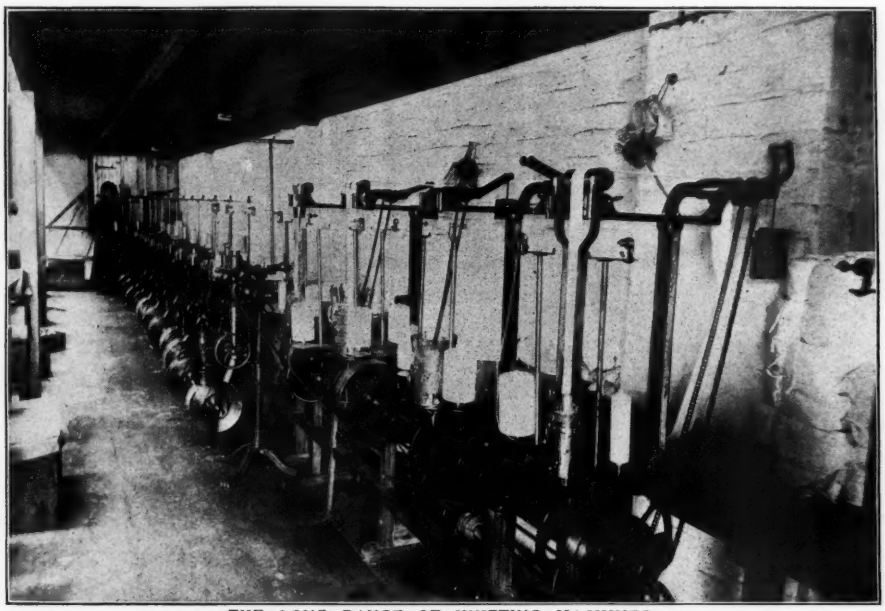
SEWING-ROOM, WITH KNITTING-MACHINES RANGED ALONG THE RIGHT-HAND SIDE WALL.

burners. This is made with knitted fabric; or in the "XXX" form of woven material. There are "Evening Star" mantles, and fine mantles they are, in both the upright and inverted types. These last-named mantles have a distinctiveness of their own. The stocking is made by what is known as eccentric weaving. Each mantle has an asbestos and specially strengthened top; and at the base it has specially tight weaving; so as to offer resistance to the fraying tendency of lateral sway. The body of the mantle is made, vertically, alternately tight and loose; and this construction, it is claimed, gives the maximum strength and illuminating power—of course, coupled with proper attention to all the details that go to make for excellence in a mantle. They are clean looking mantles. A few words were let fall at this stage as to the advantages of loom-woven mantles, and the informant's own words will be more descriptive and intelligible than perhaps would be the writer's: "They are," he said, "constructed upon a principle entirely different from knitted mantles; the mesh being made by a series of straight ramie threads, crossing horizontally and vertically, forming a square network, which, in its turn, forms small cells capable of great elasticity and resistance to pressure. The construction of loom-woven mantles is such that each thread carries its own weight only, instead of the weight of the whole of the mantle being dependant on a single thread, as is the case with knitted mantles. This fact is an explanation of the enormous advantage for maintenance work, as, in addition to their great durability, they have a high lighting efficiency." This is the theory, and practice confirms it. Except for the high-pressure types, ramie is being used for the mantles; and the firm are also introducing into certain of their productions the use of artificial silk. There is room for improvement in the silk; but the firm believe they are well to the front in this direction. Anyway some of the products in this line that were examined won estimation for their high class and refined appearance.

The mantles to which reference has been made are of the ordinary types—for upright or inverted burners of the ordinary, the medium, or the bijou type. Another special form is the inverted mantle for low-pressure high-power burners; and the woven type of fabric for this particular use is again favoured. There is a point about this mantle that is noticed. It is what is called the pleatless sack shape. Many inverted mantles are sewn at the bottoms, so that one gets a gathered uneven surface at that part, with a "pip" in the centre. This mantle has a smooth curved base, of equal substance with the remainder of the mantle, with the result that incandescence at the bottom is comparable with that of the rest of the mantle. The "Evening Star" inverted mantle, previously referred to, is also finished in the same manner. High-pressure mantles are next introduced to notice. Then attention is called to the fact that the firm make mantles to the special order of gas undertakings; and, if the managers of the latter choose they can have the mantles boxed with specially printed labels. Here Mr. Hetherington said he should be pleased to see the accredited representative of any gas undertaking for the purpose of showing him over the works.

IN THE KNITTING AND WASHING ROOMS.

All that has been said is preliminary to the actual inspection of the works and processes; but what has been said shows the complete range of the mantle products of the firm. In the inspection of the processes, one is first introduced to the knitting department, where there is a long range of knitting machines, of various sizes, and producing substantial fabrics for the divers forms of mantles. Here are machines making single-knitted material or stockings;



THE LONG RANGE OF KNITTING MACHINES.

machines manufacturing double-knitted, or three-lock, material; machines turning out triplex, or six-lock, material; machines producing quadruplex, or nine-lock, material—all for different forms of gas-mantle, from the high-pressure type down to the bijou form. This does not exhaust the machines. Another is pointed out which is producing material for mantles for acetylene or petrol air-gas burners; another, the fabric for mantles for paraffin lamps; and yet another, that required for the mantles of the various pressure or gravity oil-lamps. This shows the extent to which the mantle business has grown; and it also indicates that the firm carry out the whole of the work of mantle-making from its *alpha* to its *omega* under their own supervision, on British soil, and by British labour.

Turning from these lively and productive machines, in the same department we see the fabric (as cut into lengths) undergoing, through the dextrous fingers of the girls, the first of the several processes necessary to the perfected article. But before noticing these processes, we must turn aside into another department, where the washing and purifying of the material proceed. At the entrance are observed large baskets filled with woven material awaiting treatment. Inside, is seen a range of tanks, in which take place the washing and purifying. Over each tank is a supply of distilled water. The firm pump their own water; and they have their own distilling plant. Acid is used in this cleansing work; and ammonia is employed for removing the superfluous acid. At one end of the range of tanks is seen a mechanically operated paddle rinsing vat for ensuring thorough rinsing. In another part there is a centrifugal machine in which the bundles of material are placed for undergoing partial drying, to relieve it of moisture before it is introduced to the successive stages in the cleansing processes. After the material has been through these operations, it is taken to the drying room, where it is hung and exposed to a temperature of about 100° Fahr. This thorough cleansing of the material is highly essential to the production of a high quality mantle; and it gets it here.

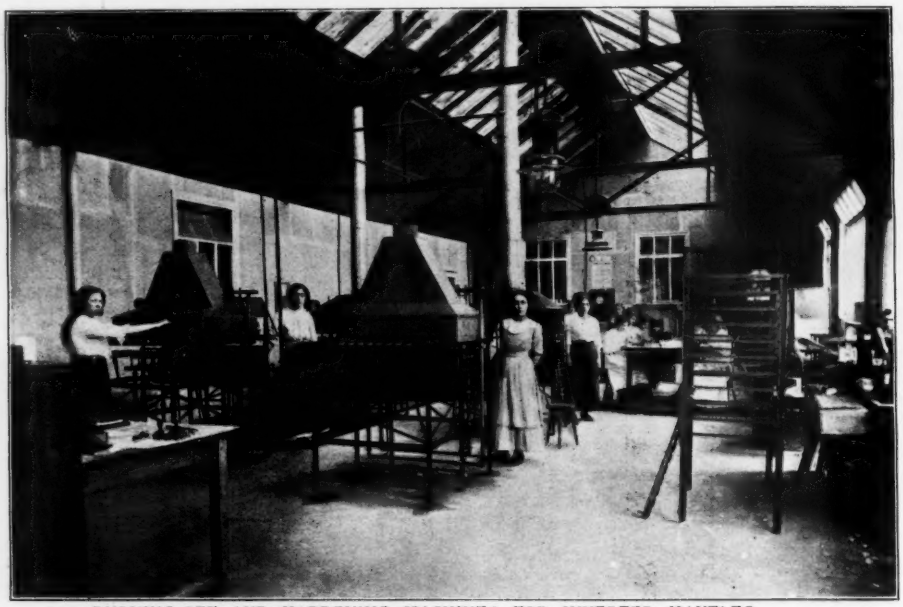
But to return to the knitting-room, to the long tables where the girls are busy dealing with the stockings which have been cut from the material into proper lengths. In the case of the vertical mantles, the tops are dyed mechanically, which ensures even treatment. The heads are also mechanically pleated; and, by the aid of another little machine, the heads are drawn up tight by asbestos thread, and then tied by the girls—that is to say, in the case of those mantles that are not fitted with metallic caps. The inverted mantles that are not of the pleatless form are also pleated by the aid of a machine. In fitting on the rings and in tying, the inverted mantles are dealt with on shapes which give to the mantles of each size uniformity in length.

Laboratories, Pump-House, and Mess Rooms.

In passing from the knitting and sewing room, some buildings put to various uses are looked into. There are the laboratories and chemical mixing rooms, which are under the care of Mr. W. Edwards, M.Sc. There is one thing that Messrs. Curtis's and Harvey can claim, and it is that, in taking up mantle making, they had at command special chemical experience and facilities. Their laboratories and equipment show this. In the mixing-room the solutions required are very carefully prepared, under Mr. Edwards's supervision. We pass the stores in which are the flat cut material for making-up the packing cases for the different mantles, and which, as already said, can, if desired, be labelled by the special announcements of gas undertakings.

We pass on, coming face to face with a large group of corrugated iron buildings—ground floor ones—with plenty of windows and doors, all opening out on to green and wooded surroundings. We peep into the girls' mess-room, where preparations are going forward for tea. There is a large gas-cooker there and other

BURNING-OFF AND HARDENING MACHINES FOR UPRIGHT MANTLES.



BURNING-OFF AND HARDENING MACHINES FOR INVERTED MANTLES.

conveniences for preparing meals, under proper supervision. This is as things should be. We look into the pump room and repair shop. Here the gas used in the mantle factory is being raised to 12 lbs. pressure; and at the different points of use it is reduced to the pressure needed for the particular purpose. In the same room, there are a bench and tools for the carrying on of repair work.

The mantle factory is driven by electric-motors; and it is learned that the energy is gas-engine generated.

Impregnating.

These points by the way. We come to the room in which the impregnating of the mantle fabrics is proceeding by the aid of a little machine. The fabrics are first dipped in the solution, and then one by one are run through the machine, by the adjustable rollers of which equality in impregnation is assured. The materials are then placed on glass moulds, and are passed forward into a drying-room, maintained at a temperature of about 100° Fahr.

The Metal-Headed Mantle.

On the way to the burning-off and seasoning room, attention is drawn to the metal capping of the "Ironclad" vertical mantle. With a girl attendant to each machine, the work goes on rapidly and regularly. The process is simple, but interesting. The cap consists of a small upper and lower plate. The lower plate, which carries four upwardly turned projections, is placed on the top of a spindle, and the mantle is pulled over this. As the spindle is raised by the action of the machine by the operator, a number of needles shoot out at the top of the spindle. The upper plate is laid on, with the projections of the lower plate shooting up through it. The second action of the machine clamps the plates together by turning-down the projecting points of the lower plate over the upper one. A good and neat job is made of this capping.

Burning-off and Seasoning.

Here we are in the large and well-ventilated burning-off and hardening room. The writer has spoken of the fact that in this factory the firm use, in the vital operations of mantle manufacture, their own patent machines; and here some of them are seen in the burning-off and seasoning machines. From this point, everything proceeds with mechanical precision. There is no more touching of the mantles by hand until they are actually boxed. The human factor is indeed entirely eliminated in the further production of the mantles—time and good or indifferent action are not left to the discretion and mood of the girls; and the most that can be said for the workers in these departments is that they are machine attendants.

The upright mantle burning-off and hardening machines are first of all inspected. They are regulated to requirement. All the attendant of one of them is called upon to do is to feed the machines with rods—one either side—each carrying ten mantles. She touches a foot lever, and the machine is set into operation. The movement of the working parts brings the mantle into contact with the flames from top burners, which consume the combustible material. The operations are so timed that the mantles are left to thoroughly cool. Then the gas at a pressure higher than is customarily used, comes on; and, by the mechanical rising and falling of the burners, the hardening automatically proceeds—the mantles being exposed to the same temperature for the same length of time in their every part. To the high flame temperature to which the mantles are all subjected, and the precision of the operation, the firm attribute a large part of the durability and shapeliness of their mantles. Before leaving the machine there is a further special head burning; and then the mantles, still suspended on the rods, are conveyed through an aperture into the collodionizing-room.

THE PACKING AND BOXING ROOM.

In an adjoining department was also witnessed the operation of the burning-off and hardening machines for inverted mantles. The principles are the same as already described for the upright form of mantles. In this case, however, the fabric is first burned thoroughly by a downward spray of flame. Then under high-pressure ring-burners are brought into action—rising gradually upwards, but stopping to give the bases of the mantles and the part round the supporting rings a special hardening, as these are the two most treacherous points about an inverted mantle.

Collodionizing, Drying, and Trimming Machine.

In the collodionizing room, we see machines the like of which have not been met with before in visits to mantle factories. The functions of the machines are threefold; and again we get through their operation the mantles all subjected to the same precision as has already been witnessed. The machines are large and enclosed. The mantle-laden rods are placed in one end; and the mantles, by the working of the machine, are equally dipped in the collodionizing solution. After draining over the trough containing the solution, the rods with their mantles travel forward into the machine, which internally forms a drying chamber, with the temperature maintained at about 100° Fahr. At the other side of the machine, before the girl removes the mantles, the bottoms of them are trimmed in one operation.

Sorting and Packing.

The mantle is now completed by these mechanical processes. There is nothing more to do but to individually examine the productions and to pack them. The care taken in inspection is observed. Note is made of the box-making and packing; and with the new strong boxes the firm are using, no injury in normal transit ought to befall the mantles.

On passing from the works, there was seen on the road the (for the day) last van-load of mantles going to the railway station; thence to their destinations, where they will perform their destined light-producing function.

COMMERCIAL GAS COMPANY.

The following is the report, for the six months ended June 30, of the Directors of the Commercial Gas Company.

The revenue account shows a net profit for the half year of £72,929 2s. 6d., which, added to the balance of £84,381 15s. 2d. brought forward from the previous half year, produces a net revenue balance of £157,310 17s. 8d. Deducting therefrom £8147 19s. 9d. for interest, there remains standing to the credit of net revenue account a balance of £149,162 17s. 11d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 9s. 4d. per cent. per annum on the 4 per cent. stock of the Company, and of £5 6s. 8d. per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

Aug. 5, 1913. William Graham Bradshaw, Chairman.

The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 30th of June amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,447,696 10s. 2d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,660,509 0s. 2d. There is thus a balance of £54,443 15s. 9d. carried to the balance-sheet. A sum of £1026 was expended during the half year on new and additional mains, services, stoves, &c.; but £3555 is credited for plant, meters, prepayment meters, and fittings. The reserve fund amounted at the close of the half year to £38,115, and the insurance fund to £32,599.

The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal and oil, including dues, carriage, unloading, and trimming	£97,528 3 9	
Salaries of Engineer and officers at works	2,025 9 7	
Wages (carbonizing)	10,199 8 4	
Purification, including labour	1,474 9 4	
Repair and maintenance of works and plant, materials and labour (less £319 5s. 8d. received for old materials)	25,942 11 8	
		£138,070 12 8
Profit sharing		3,848 13 7
Distribution of gas—		
Salaries and wages of officers (including rental clerks)	£5,779 15 3	
Repair, maintenance, and renewal of mains and services, material and labour	8,367 14 11	
Repair and renewal of meters	3,354 11 0	
,, ,, ,, ,, stoves	11,298 17 1	
,, ,, ,, ,, prepayment meters and fittings	11,678 2 11	
Incandescent mantle maintenance	840 6 11	
		41,319 8 1
Public lamps—lighting and repairing		2,689 13 10
Rent, rates, and taxes		15,867 13 11
Management—		
Directors' allowance	£1,250 0 0	
Company's Auditors	75 0 0	
Salaries of Secretary, Accountant, and clerks	1,166 9 3	
Collectors' salaries and commission	1,628 17 7	
Prepayment meter collection	3,311 0 10	
Stationery and printing	1,226 3 1	
General charges	1,874 14 9	
		10,532 5 6
Bad debts		397 15 10
Law and parliamentary charges		328 19 8
Superannuations and allowances and Workmen's Benefit Society, &c.		2,215 4 9
Official officers, &c.		125 9 9
National Health and Unemployment Insurance		513 2 10
Total expenditure		£215,909 0 5
Balance carried to net revenue account		72,929 2 6
		£288,838 2 11

Receipts.

Sale of gas—		
Per meter (number in use, 110,889) at 2s. 4d. per 1000 cubic feet	£192,183 17 7	
Public lighting and under contracts	5,611 6 10	
	£197,795 4 5	
Less discounts and allowances	5,079 15 5	
		£192,715 9 0
Rental—		
Meters (23,918)	£2,875 2 1	
Stoves (72,225)	11,555 11 0	
Prepayment meters (86,247) and fittings	16,141 2 0	
Incandescent mantle maintenance	8 9 3 2	
		31,390 18 3
Residual products—		
Coke, less £3308 9s. 3d. for labour	£38,052 8 4	
Breeze, less £915 6s. 1d. for labour	1,486 17 7	
Tar	11,397 3 2	
Ammoniacal liquor and sulphate of ammonia	13,736 19 1	
		64,573 8 2
Miscellaneous receipts—		
Rent receivable	£28 5 0	
Transfer fees	30 2 6	
		58 7 6
Total receipts		£288,838 2 11

The following statements relate to the working:—

Statement of Coal and Oil.

—	In Store Dec. 31, 1912.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store June 30, 1913.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	18,514	97,431	89,625	685	25,635
Oil—gallons	506,746	1,446,401	1,454,948	..	498,199

Statement of Residual Products.

Description.	In Store Dec. 31, 1912.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1913.
Coke—tons	5,480	56,015	7,109	47,762	6,624
Breeze—tons	2,976	8,675	..	9,041	2,610
Tar—gallons	498,650	1,161,077	..	1,322,939	336,788
Ammoniacal liquor—butts of 108 gallons	7,903	32,837	35,093	..	5,647
Sulphate of ammonia—tons	140	1,148	..	1,088	200

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,819,716	36,817	1,648,626	1,712,738	3900

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £26,715; coke and breeze, £5344; tar, ammoniacal liquor, sulphate of ammonia, &c., £9432; sundry stores, £33,733—total, £75,224. The figures this time last year were: Coal, oil, &c., £15,496; coke and breeze, £1209; tar, ammoniacal liquor, sulphate of ammonia, &c., £10,635; sundry stores, £34,806—total, £62,146. A sum of £25,469 stands in the balance-sheet as employees' bonus and savings, compared with £21,444 at the end of June, 1912.

Recent Wills.—Mr. John Armitage Drake, the Managing-Director of Drakes Limited, whose death on July 4, in his sixty-third year, was noticed in the "Journal" at the time, left £36,966, of which £26,006 is net personalty. Mr. Bedford Marsh, the Chairman of the Kingston-on-Thames Gas Company, left estate of the gross value of £41,673, of which £29,046 is net personalty. Mr. John Parnell, a Director of the Waltham Abbey and Cheshunt Gas Company, left estate, "so far as can be ascertained," of the gross value of £27,830, of which £19,768 is net personalty.

THE BAYER PROCESS OF PURIFYING AND ENRICHING GAS.

We have received from M. Léonce Fabre, of Marseilles, a number of the "Revue de Chimie Pure et Appliquée" containing an article by M. Bayer, the Engineer-Chemist at the Municipal Gas-Works at Brünn, the capital of Moravia, describing his process of purifying and enriching gas by the atomization of suitable liquids. The process has been patented in France, and from the specification (No. 444,295 of 1912) and the article referred to the following particulars are taken.

M. Bayer begins by offering some general observations upon the advantages of vesicular vapour in bringing about an intimate mixture of a liquid with a gas; and he points out that, thanks to this molecular division, the absorption of the impurities in the gas into an appropriate vapour is effected to the greatest extent. Atomizing the liquid in an ascending spray is, he submits, the best means of obtaining a finely-divided rain. The result of a very close study made by him of upward vesicular atomization was to lead to the conclusion that its industrial application ought to render very great service in the purification and enrichment of gas. He reviews briefly the various appliances now in use in gas or coke-oven works for the removal of naphthalene and tar, the absorption of ammonia, &c., and the enrichment of gas by benzol and the volatile hydrocarbons.

Removal of Naphthalene.

Dealing first with the removal of naphthalene, M. Bayer says he has found that the light oils of commerce are best adapted for the purpose; and as those containing 60 per cent. of the fraction distilling between 100° and 180° C. and from 35 to 40 per cent. of average oil of a fraction from 180° to 230° dissolve a larger proportion of naphthalene up to 21 to 30 per cent., and offer great facility for atomization at the ordinary temperature and for re-condensation, he was led to treat these oils by vesicular atomization for the purpose specified. Vaporization of the light oils presents the advantage of rather enriching the qualities of the gas to be purified by necessitating a smaller consumption from the fact of the great solubility of naphthalene in these oils.* All that is necessary is to mix as intimately as possible the crude gas leaving the condenser with a light tar oil of the composition above indicated by means of an atomizer, brought into the condition of vesicular vapour, and afterwards to separate the oils charged with naphthalene by condensation in a Pelouze and Audouin apparatus, or by any of the other well-known appliances. After this the gas would undergo ordinary chemical purification.

To carry out the operation indicated in the preceding paragraph, M. Bayer has devised a powerful apparatus, to which he has given the name of "Excelsior," which is employed for the production of the vesicular oil vapour, and for mixing it intimately with the crude gas. It is shown in section in the accompanying illustration (fig. 1).

It consists of a sheet-iron cylinder A, divided in its upper part by several plates B perforated with holes, and terminating at its base in a kind of funnel or cone C, or an inclined plane. At the lower part of the apparatus is a device consisting of one or more sprayers D, to which flow the oils, fresh or condensed, being con-

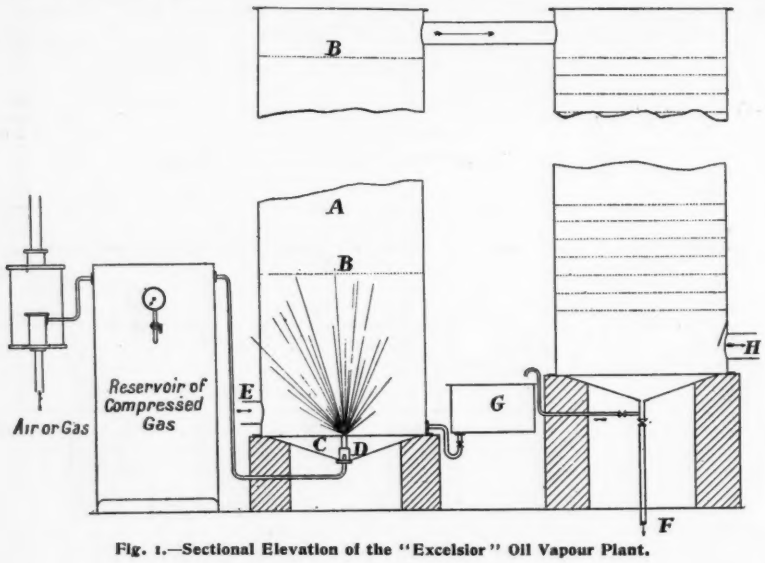


Fig. 1.—Sectional Elevation of the "Excelsior" Oil Vapour Plant.

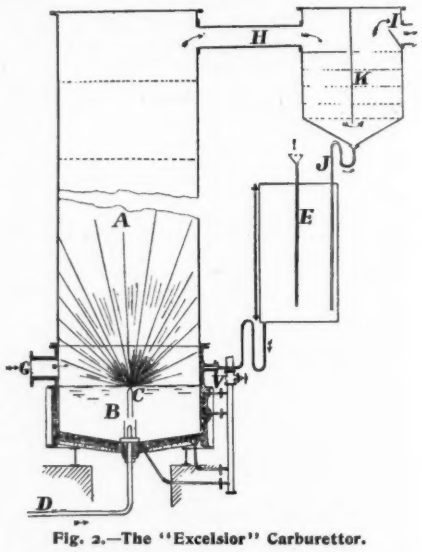


Fig. 2.—The "Excelsior" Carburettor.

stantly drawn into the sprayers to be atomized. The vaporized oils escape from the nozzles of the atomizer in the form of a large cone of vesicular vapour, which mixes very readily with the crude gas entering the apparatus at E, the delivery of which can be easily regulated. The cylinder is connected at the top with a second cylinder inside which there are several sheet-iron partitions placed as shown. They are pierced with holes or slits which act upon the gaseous current, and thus facilitate the working of the Pelouze apparatus, into which it passes. The oils condensed flow away drop by drop and collect in the lower part of the cylinder, to be again utilized in it or conveyed saturated to the tar-tank by the pipe F. On the extreme left of the diagram is the compressor, and next to it the reservoir of compressed gas. G is the oil-store, and H the pipe which conveys the gas into the Pelouze apparatus.

The "Excelsior" Carburettor.

In many cases the managers of gas-works are compelled, notwithstanding all the attention given by them to the carbonization of the coal, to enrich their gas in order to comply with the terms of their contracts. It consequently happens that sometimes very large volumes of gas have to be enriched rapidly, and therefore it is necessary to have at command the means of effecting this efficiently in the shortest possible time. M. Bayer submits that the upward spraying of the enriching hydrocarbons enables this to be easily done; and he says the operation can be performed by the "Excelsior" carburettor, which is shown in fig. 2.

It will be seen that it is similar to the appliance previously described. It consists of a vertical cylinder A terminated by a conical cast-iron base B, which can be heated by steam by means of the valve V. In the centre of the cylinder, level with the liquid, there is an atomizer C actuated by compressed gas supplied by the pipe D. In the cylinder are placed partitions made of perforated sheet iron. Connected with it is another and shorter one acting as a collector for retaining the traces of the carburetting material which are carried forward, and fall in drops from the partitions. The reservoir E contains the enriching liquid, which flows in the base of the apparatus, and reaches the atomizer, by which it is quickly converted into vesicular vapour. The purified gas enters the carburettor at G, rises in the cylinder in intimate contact with the vaporized hydrocarbon, traverses the pipe H, descends into the collector K, which is divided by a partition, rises again, and escapes by the pipe I after having deposited the excess of the carburetting material in the conical base of the collector, whence it is conveyed back into the reservoir by the syphon pipe J. A level on the side of the apparatus shows exactly the height of the enriching liquid, and the quantity used per hour. It is claimed for this carburettor that it is very simple and at the same time strong; and it obviates loss of benzol by re-condensation, allows of the carburetting of large volumes of gas, and does not require a high temperature for the volatilization of the benzol. If, instead of benzol or light petroleum oil, the vessel is supplied with vegetable or other oils, of higher distillation temperature, and low-grade or producer gas is admitted by the pipe G, it will be possible, thanks to the heating of the cast-iron part of the vessel, to obtain more intense volatilization.

Purification from Ammonia.

Dealing with the purification of gas from ammonia, M. Bayer briefly refers to the several appliances now in use for the purpose, and points out what he regards as the drawbacks connected with them. The admission of ordinary water into the last compart-

* *Vide* the third section ["Naphthalene"] of Dr. W. B. Davidson's paper on "Liquid Purification," submitted to the last meeting of the Institution of Gas Engineers, and given in the "Journal" for June 24 (p. 948).

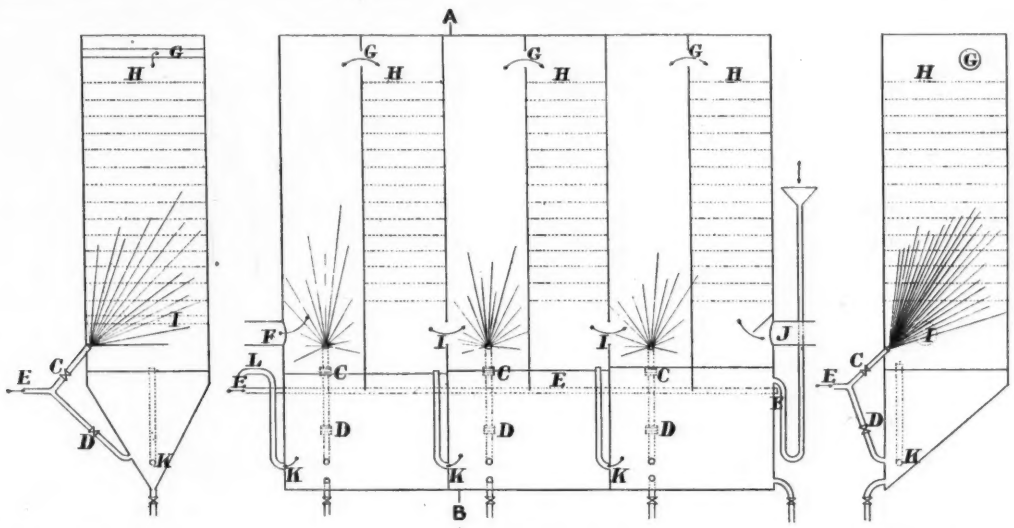


Fig. 4.—Section on Line A B. Fig 3.—Longitudinal Section. Fig. 5.—Section on Line A B.

THE "EXCELSIOR" WASHER.

ment of the apparatus traversed by the gas causes precipitation of the calcareous salts, and rapidly clogs the boards, sheet-iron plates, brushes, &c. Moreover, the gas flowing into the washer may carry with it a certain quantity of naphthalene; and this eventually fouls the first compartment. These inconveniences may, it is said, be removed by adopting the "Excelsior" washer, as shown in the accompanying diagrams (figs. 3, 4, and 5).

The calcareous salts, tar, and naphthalene are deposited in the lower part of the apparatus, which may be conical shaped or inclined as shown in figs. 4 and 5, which are sections on the line A B of fig. 3. By turning the taps V from time to time, these deposits may be removed. Each compartment comprises an atomizing device placed at the lower part of the left-hand half; whereas the other half, which is separated from the former by a vertical partition, is divided by a series of horizontal wooden or other grids, and acts as a collector for the vesicular vapour. To facilitate erection and cleaning, the atomizer, outside the chamber, communicates with the latter by pipes C, each furnished with a cock; while the ammoniacal liquor employed for vaporization reaches the atomizer through the lower pipe D, coming from the bottom of the compartment (see fig. 4). Gas or compressed air is admitted by the pipe E. Each atomizer is independent, and can be easily regulated, as can also the proportion of water to the quantity of gas to be purified.

As shown by the arrows, the gas enters the apparatus at F, and passes before the first atomizer, ascends in the left-hand half of the first compartment, flows through the opening G, descends through the grids H in the right-hand half of the first compartment, goes on through the lower opening I, ascends into the left-hand half of the second compartment, after having passed the second atomizer, traverses the grids of the second compartment, and so on to the last, from which it issues by the orifice J. The washing water is fed into the apparatus by the funnel and syphon pipe shown on the right-hand side of fig. 3. It fills the conical or inclined base of the third compartment, flows to the next through the pipe K, and finally leaves the apparatus in a saturated condition by the pipe L. The partitions of each compartment descend into the portion containing the liquid, which thus forms a hydraulic seal, and compels the gas to pass through the apparatus in a zigzag direction. The vesicular vapour acts in the left-hand portion of the apparatus, and the drops of liquid continue to effect the absorption of the ammonia through the grids in the right-hand portion, so that the liquor is saturated to its maximum with ammonia.

With an "Excelsior" washer of 1¾ million cubic feet capacity, the gas will travel at the rate of about 16 inches per second. This appears to be a very high speed compared with scrubbers or other washing appliances; but in the water-spray system under notice there is an exceedingly large condensation surface. It is natural that the purifying operation will be complete even if a minimum number of absorption compartments are employed, and that the ammoniacal liquor will be much stronger than that obtained with the appliances generally in use; while the quantity of water required will be a minimum, and the washing operation methodical. The washer requires a very small amount of motive power to work it—from ½ to 1½ H.P. for one dealing with 1¾ to 2¼ million cubic feet, with a maximum consumption of 44 to 66 lbs. of oil per 353,000 cubic feet of gas to be purified.

With regard to the cleaning of the washer, it is only necessary to consider its simple construction in order to understand the facility and rapidity with which this operation can be performed. By closing the tap C and opening D and V, the deposits can be removed each day without difficulty; and in no case is it so great as to decrease the efficiency of the apparatus.

The "Excelsior" washer may be used for removing the sulphuretted hydrogen, cyanogen, and other impurities from illuminating gas, if the appropriate solvent is sufficiently fluid to permit of its atomization into a powerful spray.

The Proposed Supply of Water Gas in Paris.

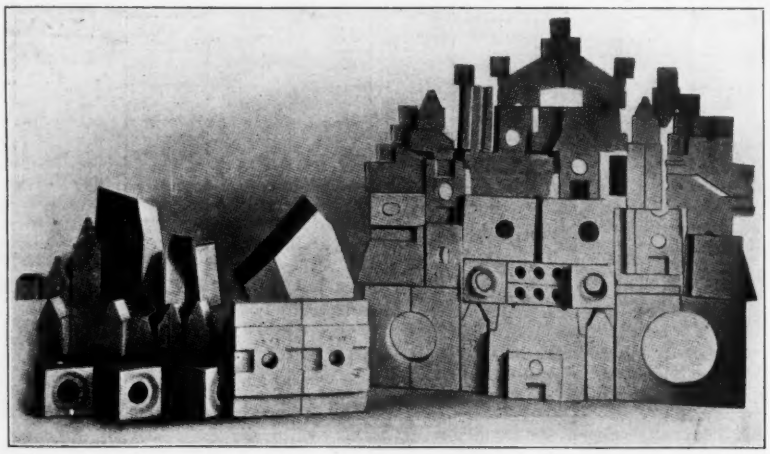
The report of M. Dausset on the proposed supply of water gas in Paris, to which reference was recently made in the "JOURNAL," was presented to the Municipal Council at their last meeting before the vacation; and, after some discussion, the further consideration of the subject was postponed till October or November. The scheme submitted by the Paris Gas Company provides for the installation at Le Landy, Cornillon, Villette, and Clichy stations of apparatus of the Dellwik-Fleischer type, with all the necessary auxiliary plant. The total capacity will be about 9½ million cubic feet, in eighteen units—three each at the Villette and Clichy stations, and six each at the other two. The Cornillon works, it may be remembered, are the new ones adjoining those at Le Landy. As the four stations have a daily productive capacity of 88¼ million cubic feet of coal gas, the water gas to be manufactured would represent about 13 per cent. of the total make.

Humphrey Pump Tests at Chingford.—With reference to the official trial of the Humphrey pumps at the Chingford reservoir, an account of which appeared on p. 375 of the last issue of the "JOURNAL," it may be mentioned that, at the request of the Metropolitan Water Board, the tests of the efficiency of the gas-producers and of the fuel-gas consumption of the pumps were carried out by Mr. G. Warburton, the Chief Chemist, and Mr. P. Gardiner, the Assistant Chemist, of the Tottenham and Edmonton Gas Company. Their results as independent experts formed the basis for calculating the efficiencies of the pumps.

The Late Mr. Brady.—When noticing, in the "JOURNAL" for the 29th ult., the death of Mr. Anthony N. Brady, the American multi-millionaire, it was mentioned that he was connected with a number of gas and electric light companies. We learn from the "American Gaslight Journal" that among the most prominent of them were the Consolidated Gas Company of New York, the New York Edison Illuminating Company, the Brooklyn Edison Company, and the Peoples Gaslight and Coke Company of Chicago.

American Natural Gas.—Natural gas occurs to an available commercial extent in 23 States of the American Union; the estimated total area of the fields being 9365 square miles. These areas may be subdivided into seven principal fields—viz.: (1) The Appalachian region, including New York, Pennsylvania, South-Eastern Ohio, West Virginia, Kentucky, and Alabama; (2) the Trenton Rock, or Ohio and Indiana field; (3) the Clinton Sand or Central Ohio field; (4) the Mid-Continent or Kansas and Oklahoma field; (5) the Caddo field in North-Western Louisiana; (6) the Texas fields; (7) the Californian fields. The first use of natural gas in the United States was made in 1821, at Fredonia, New York, where a well 27 feet in depth supplied enough gas for thirty burners. An hotel was illuminated from the same well upon the occasion of the visit of General Lafayette to the United States in 1824. Natural gas was not used for manufacturing purposes by the Americans until 1863, when it was made available at East Liverpool, Ohio. The first natural-gas pipe-line was laid in 1876 to supply Titusville, Pennsylvania, from a well 786 feet deep; and the same year gas was brought to Pittsburg from a well 19 miles distant in Butler County.

AMERICAN SILICA FOR RETORTS AND SETTINGS.



SILICA SHAPES MANUFACTURED BY THE AMERICAN REFRACTORIES COMPANY.

THE interest that has been aroused in technical gas circles by the remarks, at the meeting of the Institution of Gas Engineers, of Herr E. Körting and Mr. R. M. Searle, on the use in America of silica material for retorts and settings, together with the letter of "C.E." in our issue of July 15 last, justify the matter being kept well to the front, supplemented as the information available is by the sanguine feeling of our American friends that silica material is going to prove an important step forward in the construction and life of retort-settings. Within the past few days we have received from Mr. H. Russell, Superintendent of Gas Manufacture, of the Rochester (N.Y.) Railway and Light Company, a copy of a pamphlet on the subject, issued by the Improved Equipment Company, of New York and other cities in the States. While recognizing that the pamphlet has been prepared for commercial purposes, our readers, we think, will be interested in the reproduction of the following portions of the print.

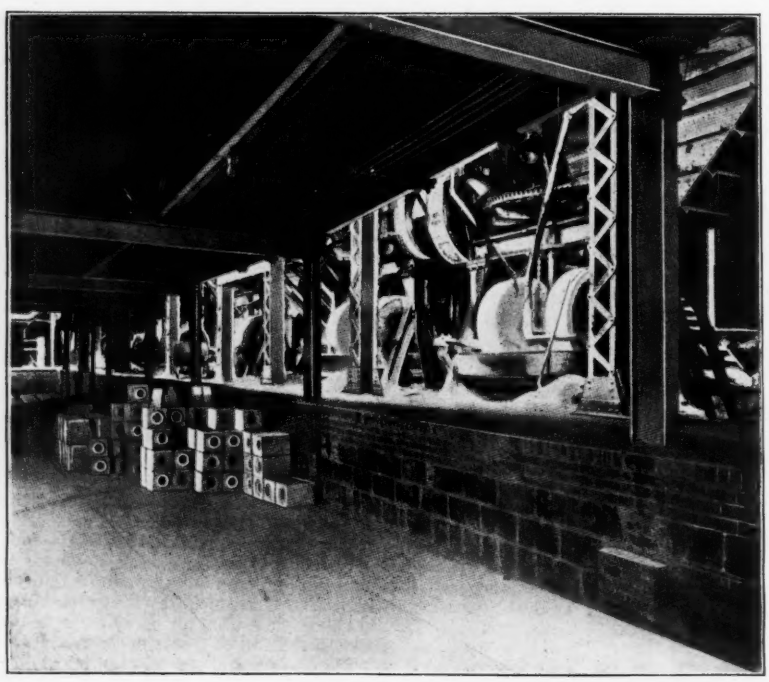
SILICON.

Silicon is a non-metallic element, having an atomic weight of 28·3 and a specific gravity of from 2·5 to 2·8, and is designated by the chemical symbol Si. It is not met with in Nature in the pure state, and is not readily reduced to such condition from the various compounds in which it naturally exists. Under suitable conditions, however, it may be reduced as a dull brown amorphous powder, as metallic scales, resembling graphite, or as dark gray globules, sometimes showing crystallization. In the pure state this element is of little interest to the user of refractory materials; but in other forms, particularly silicon dioxide, or silica (SiO_2), it is of the greatest interest, and is one of the most useful and satisfactory materials for refractory purposes. Nature has furnished an inexhaustible supply of practically pure silica in many forms; and next to sand the most common is quartz—such as ganister, chert, and hornstone, as applied to flinty rock. It also occurs in Nature to a vast extent in the form of silicates, or compounds of silica with various bases.

SILICA REFRACTORIES.

Silica as a refractory material is made use of, to a large extent, in two ways—as silica (96 per cent. pure), and as silicate of alumina (commonly known as fire-clay) seldom, if ever, pure. Each of these forms has limitations peculiar to itself, and under many conditions the one form is exactly suitable where the other is more or less of a failure. Material 100 per cent. pure is met with commercially as fused silica; and the peculiar properties of this form of silica are now generally known. Fused silica as a refractory material has not as yet progressed far beyond the laboratory.

In the form of silicate of alumina—fire-clay—it is probably in its more refractory condition, but at the same time in a condition in which it is most difficult to obtain it pure. Pure fire-clay is a hydrous silicate of alumina, having a theoretical melting-point much above that of silica. But pure fire-clay exists only in the laboratory, if at all; and as clay, found in Nature, is in a condition of great impurity, it is commercially impossible to manufacture an unvarying refractory product from it.



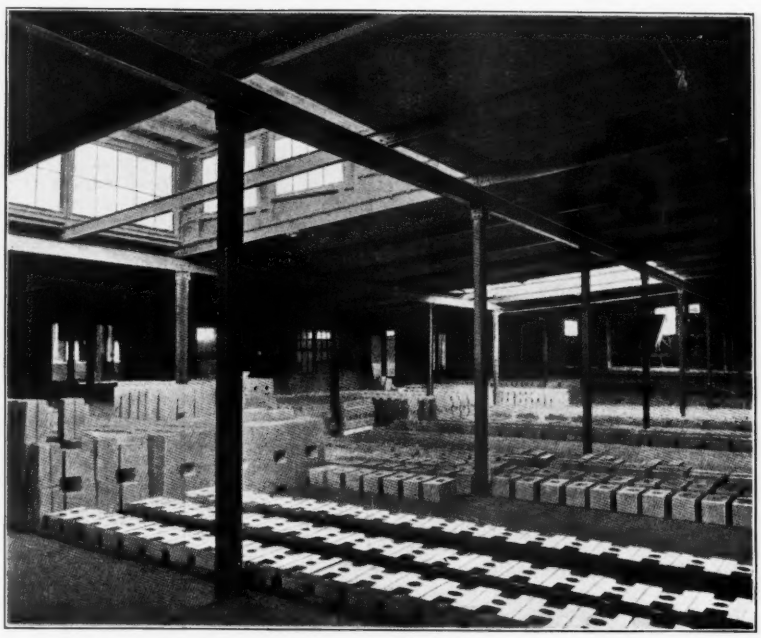
PANS FOR GRINDING AND MIXING SILICA IN THE MANUFACTURE OF "AMERICAN" SILICA MATERIAL.

Silica, 96 per cent. pure, is a manufactured product of ganister rock; and as naturally the raw material is found of unvarying purity, it follows that, with reasonable care in manufacture, the resulting product will be equally pure and uniform. It is this material in which we are interested, as it offers a solution to many of the difficulties which have attended the use of clay refractories. It can be depended upon as to chemical purity; and its physical properties—such as heat resistance, conductivity, and porosity—are not subject to any variations. It is, perhaps, owing more to these physical properties than to any other that silica is so well adapted to replace fire-clay for retorts and settings in gas-benches. It conducts heat 50 per cent. better than clay; it will withstand a higher temperature than fire-clay available for this use; and its porosity is less and more uniform than clay.

Silica brick and tile are made of a mixture of finely crushed ganister, with a small percentage of a chemical base which acts as a binder, and the compound pressed or rammed into moulds and then burned in

kilns similar to those used in burning high-grade fire-clay brick and other highly refractory materials. Silica itself is chemically an acid, and the binder is chemically a base; and the burning of the two in the mixture makes a bond between the particles of silica which gives a certain degree of hardness and uniform structure to the finished product. This chemical bond alone is not sufficient to give the silica shapes the resistance to crushing, breaking, and abrasion which is necessary to withstand the service required of them. A certain physical bond also is needed, resulting from the shape of the silica particles themselves, to give a structural rigidity to the product, in addition to the chemical bond which is created in the burning process. If the raw material is sandy, its particles are more or less round, and have fewer points of contact in the mixture. The best grade of silica material is made from crushed ganister, which is composed of a vast number of small, sharp, irregular particles merging under pressure into a solid, uniform mass.

Knowing the shortcomings of fire-clay material, the Improved Equipment Company, after careful and thorough investigation, decided on installing silica retorts and settings in the Doherty economizer bench; but they withheld the announcement until they were able to supply a silica material of a quality consistent with the high standards in material and construction of the Doherty economizer benches. After careful investigation, the Company decided upon the use of silica material as furnished by the American Refractories Company as the highest grade of silica material to be obtained, and secured the exclusive right to use and furnish this material in gas-benches.



DRYING "AMERICAN" SILICA SHAPES ON THE STEAM-HEATED FLOOR.

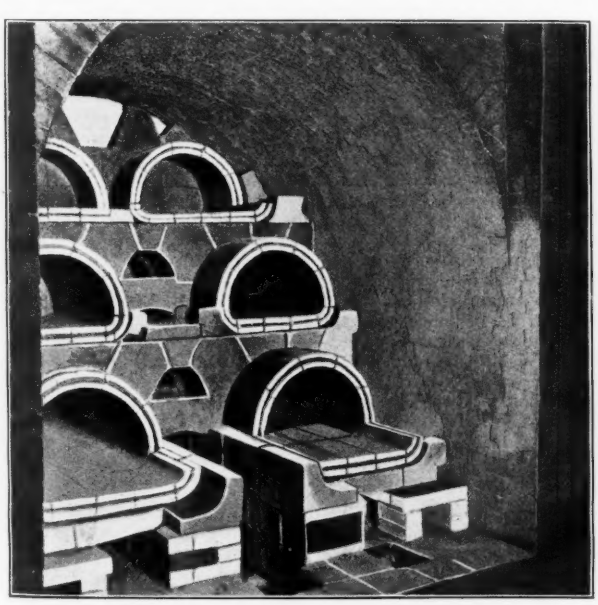
The best silica in America for making silica brick and tile is the ganister rock obtained from Devil's Lake, Wisconsin, which is the hardest, toughest, and most refractory of any ganister rock yet found. The American Refractories Company's quarries are at Devil's Lake, and they are the only manufacturers using Devil's Lake ganister. As an evidence of the recognized superiority of "American" silica material, it is to be noted that some years ago one of the largest Steel Corporations appointed a Committee to determine the best silica refractory material to be used in its plants in the Central West. After investigations covering many months, and extending over Europe as well as America, the Committee recommended "American" silica material as the best available, and it was adopted exclusively for the first installation of 280 ovens and the second installation of 560 ovens. "American" silica is also used largely by the Semet-Solvay Company, and almost exclusively in the Koppers coke-ovens.

The Manufacture of "American" Silica Products.

The ganister rock is put through powerful crushers, and the finely crushed ganister is then conveyed by bucket conveyor to large steel bins. An accurate measuring hopper attached at the bottom of the bins permits of the loads being fed automatically into the grinding-pans. In these pans the ganister is ground into a mud by the introduction of water and the liquid bonding material; this bonding material being mechanically mixed in tubs—three tubs to each pan—which are located directly above the grinding-pans.

After the material is ground and tempered, the mixture is emptied into large buckets, suspended from a monorail, overhead trolley system, and conveyed to the different moulding tables, where the brick and tile are moulded by hand. These moulds are of steel; and the silica material is pounded, or rammed, into them hard and solid. The standard bricks are dried on cars, which are run into long tunnels, heated from the exhaust heat direct from the kilns. After the bricks are thoroughly dry, and have a "ring" to them when struck lightly, they are wheeled to the firing-kilns and "set" for burning. These kilns are 32 feet inside diameter, and work on the down-draught system, and will hold 100,000 nine-inch bricks, or their equivalent in other shapes. The tile and special shapes are dried on hot floors, consisting of steel plates, heated by exhaust steam from the power house.

The burning of each kiln requires twenty-one days. Allowing two days to "set" the kilns, the fires are started slowly, and gradually brought up to the required heat, which is held for a specified time. Then the kiln is sealed, allowed to "soak," and gradually cool off. The kiln is then opened, and the bricks or tiles inspected to see if ready for shipment.



Showing the Manner of Laying up Sectional Retorts for a Bench of Sixes.

Advantages of Silica in Gas-Benches.

The superiority of real silica over fire-clay commercially available for gas-bench work is due to several important facts—its greater heat conductivity; heat resisting capacity (durability under high temperatures); and the fact that at high temperatures it expands slightly, whereas fire-clay contracts. The best gas-bench is obviously the one which carbonizes the largest amount of coal per twenty-four hours, giving a maximum yield of gas, with the least consumption of bench-fuel. This demands rapid carbonization and utilization of the highest possible percentage of heat in the bench-fuel.

Rapid carbonization depends upon raising the retort-charge to the proper temperature in the shortest possible time, and this in turn depends upon the heat conductivity of the material of the retort. This heat-conducting quality also reacts upon the bench-fuel economy, for it means that more of the heat is utilized in carbonization. Rapid carbonization depends upon carrying as high a temperature as possible outside the retort; and this temperature is limited by the heat-resisting capacity of the material in the retorts and settings. The conductivity of the retort material is diminished by any deposit of carbon upon the walls of the retort; hence the necessity of scurfing. Furthermore, it is highly essential that there be as little leakage of gas from the retort as possible; hence the importance of a construction and material which ensure a gas-tight retort.

The charge is withdrawn from the retort when the temperature is at its maximum; and this is the time when the retort is most liable to abrasion and injury from tools or machine. The best material is the one which offers the most resistance to abrasion at high temperatures. The life of a bench-filling depends upon the ability of the retorts and settings to withstand the severe duty of high temperature operation, scurfing, expansion and contraction, and abrasion from tools.

Reviewing these features of bench economy in relation to the

use of silica retorts and settings, we find the following facts of utmost importance and interest to the gas manager.

"American" silica material has a heat conductivity much greater than that of fire-clay material. This means maximum rapidity of carbonization, heavier retort charges, and shorter periods of carbonization—all combining to give maximum retort and bench capacity per day.

"American" silica material has a fusion or softening point far beyond that of fire-clay material, making it possible to carry much higher temperatures in the bench, and further contributing both to rapid carbonization and to greater bench capacity.

"American" silica retorts have a hard, smooth surface, to which carbon does not readily adhere; so that only a fraction of the amount of scurfing needed where fire-clay retorts are used is necessary with "American" silica retorts. This, of course, contributes to the rapidity of carbonization, and reduces the time needed for scurfing.

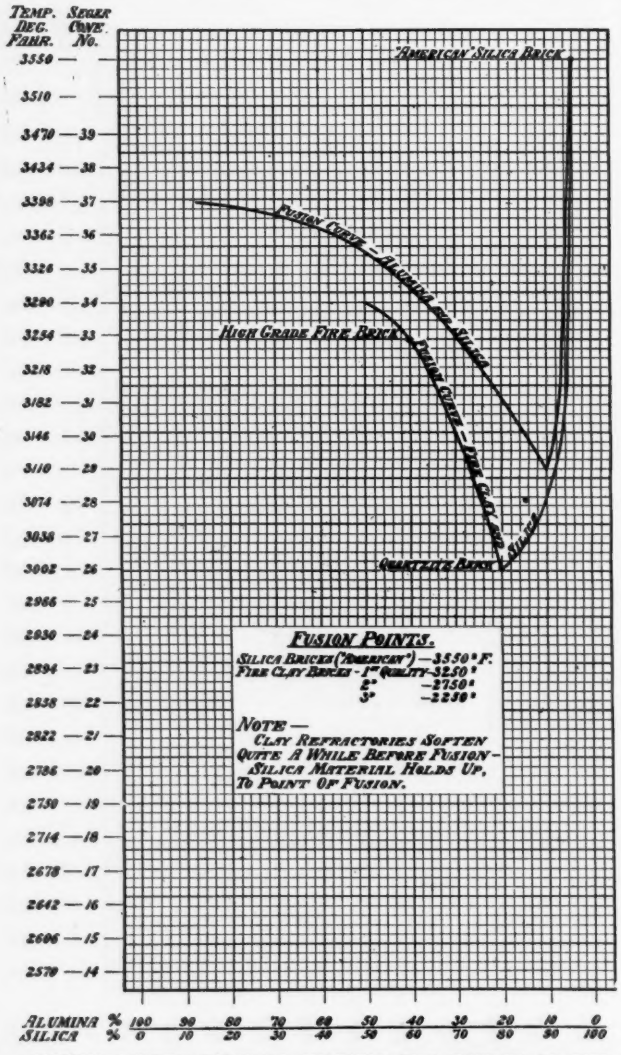
"American" silica retorts and settings retain their hardness at high working temperatures, in contrast to the tendency of fire-clay to soften at even lower temperatures. They offer a correspondingly higher resistance to abrasion and injury, meaning greater durability and less repairs.

The heat-resisting quality of "American" silica retorts and settings, their greater heat conductivity, and the lessened necessity for scurfing, all combine to secure the greatest value per pound of bench-fuel consumed—meaning marked improvement in bench-fuel economy.

Refractoriness of Fire-Clay and Silica Compared.

The accompanying curves were prepared by the American Refractories Company to show graphically how the fusion-points of refractory mixtures are affected by variations in the proportion of alumina and silica. Values read vertically are fusion-points in degrees Fahrenheit, as shown by Seger cones; values read horizontally show the proportions of alumina and silica.

The lower curve relates to mixtures of fire-clay and silica. It will be noted that what is commonly called "high-grade fire-brick" has a fusion-point of 3250° Fahr. As the proportion of silica is increased, the fusion-point becomes lower, until a mixture commonly called "quartzite brick" (80 per cent. silica) is reached.


TEMP. DEG. FAHR.
SEGER CONE No.
3550 —
3510 —
3470 — 39
3434 — 38
3398 — 37
3362 — 36
3326 — 35
3290 — 34
3254 — 33
3218 — 32
3182 — 31
3146 — 30
3110 — 29
3074 — 28
3038 — 27
3002 — 26
2966 — 25
2930 — 24
2894 — 23
2858 — 22
2822 — 21
2786 — 20
2750 — 19
2714 — 18
2678 — 17
2642 — 16
2606 — 15
2570 — 14
"AMERICAN" SILICA BRICK
FUSION CURVE — ALUMINA AND SILICA
HIGH GRADE FIRE BRICK
FUSION POINTS.
SILICA BRICKS ("AMERICAN") — 3550° F.
FIRE CLAY BRICKS - 1ST QUALITY - 3250°
2ND — 2750°
3RD — 2250°
NOTE —
CLAY REFRACTORIES SOFTEN QUITE A WHILE BEFORE FUSION — SILICA MATERIAL HOLDS UP, TO POINT OF FUSION.
ALUMINA % 100 90 80 70 60 50 40 30 20 10 0
SILICA % 0 10 20 30 40 50 60 70 80 90 100

FUSION CURVES—DIAGRAM SHOWING THE EFFECT OF THE COMBINATION OF SILICA AND ALUMINA.

Here the fusion-point rises until a maximum is reached at a 96 per cent. silica mixture—the true "silica brick."

The upper curve has to do with mixtures of pure alumina and pure silica. Starting with a fusion-point of about 3390° Fahr. for a mixture of 88 per cent. alumina and 12 per cent. silica, the curve of refractoriness falls off with the increase of silica to a minimum of 3110° Fahr. for a mixture of 90 per cent. silica and 10 per cent. alumina. From this point the fusion-curve rises rapidly to a maximum of 3550° Fahr. for a 96 per cent. silica mixture, which is the standard "American" silica brick.

The difference between these two curves, which are both expressed in terms of alumina and silica only, is to be explained by the presence of other elements in the mixture ordinarily described as fire-clay.

Some Facts Worthy of Special Emphasis, in Conclusion.

"American" silica material is made from ganister rock, and contains no alumina, except that found in the rock—never over 1 per cent. All mechanical mixtures are less refractory than the natural mixture; and the addition of silica to alumina, or the addition of alumina to silica, reduces the fusion-point.

The following is an analysis of "American" silica material.

	Per Cent.
Silica (SiO_2)	96·00
Alumina (Al_2O_3)	·90
Iron (Fe_2O_3)	·75
Lime (CaO)	2·00
Magnesia (MgO)	·05
Loss on ignition	·10

METHANE IN WATER GAS.

The "Comptes Rendus" of the French Academy of Sciences for the 30th ult. contains details of some experiments carried out by M. Léo Vignon with the view of studying the conditions attending the formation of methane in water gas. The author had noticed that water gas always contains a small quantity of methane—a fact which had been recognized by Clément and Désormes, as well as by Langlois. M. Armand Gautier, on the other hand, demonstrated that hydrogen reacts upon carbon monoxide, at temperatures from 400° to 1200° C., in order to form very small quantities of methane.

M. Vignon began by making some water gas, by causing steam to act upon two samples of coke (A and B) and one of carbonized sugar (C). He then determined the quantity of ash from the three samples, and estimated the amount of lime in the ash. The following were the results:

A.—Ash,	10·60	per cent.;	lime,	7·33	per cent. of ash.
B.—Ash,	8·70	,,	,,	8·47	,, ,,
C.—Ash,	1·22	,,	,,	0·80	,, ,,

With the two cokes he obtained water gas containing on an average (carbon monoxide and carbon dioxide deducted) 96·55 per cent. of hydrogen and 3·45 per cent. of methane; the carbonized sugar giving more than 98 and less than 2 per cent. respectively. M. Gautier had obtained from the reaction of hydrogen on carbon monoxide—

	At 400° C.	At 1300° C.
Hydrogen	99·80	98·65
Methane	0·20	1·35

In making water gas with carbon very poor in lime, M. Vignon obtained a gas containing less methane than that produced from gas coke; the proportion being similar to that formed by Gautier. This led him to investigate the influence of lime on the composition of water gas. He had already studied the decomposition of steam by carbon in presence of lime, and communicated the results to the Academy. Under the conditions described, considerable proportions of methane were formed at the expense of the carbon monoxide. The experiments referred to were made at temperatures of 600° to 800° C., below the point for the decomposition of carbonate of lime. Those now described were carried out at the normal temperature for the formation of water gas.

The first series were made with 100 grammes of coke with 10 per cent. of lime. Passing steam over the mixture at 1000° C. produced a gas containing an average of 88 per cent. of hydrogen and 12 per cent. of methane. In the second series, 15 per cent. of lime was used, and the resulting gas contained 81 per cent. of hydrogen and 19 per cent. of methane. In the third series, the proportion of lime was 50 per cent., and the gas contained 77 per cent. of hydrogen and 23 per cent. of methane.

M. Vignon then caused the constituent elements of water gas to act upon lime at about 1000° C., in order to elucidate the mechanism of the formation of methane, and he gives details of the results. The following were the conclusions arrived at: The origin of methane is found in the following reactions:

(1) $4(CO) + 2(H_2O) = 3(CO_2) + CH_4$
(2) $2(CO) + 2(H_2) = CO_2 + CH_4$
(3) $CO_2 + 4(H_2) = CH_4 + 2(H_2O)$

The second reaction takes place directly in very small proportions, as demonstrated by M. Gautier.

In the production of water gas from coke, the lime intervenes, and the percentage of methane increases in larger proportions. Below 800° C., the formation of carbonate of lime is an important factor in the production of methane. Above the temperature of decomposition of carbonate of lime—*i.e.*, above 900° C.—lime acts as a catalyzer favouring the three reactions already given.

IRISH GAS MANAGERS' ASSOCIATION.

MEETING AT BELFAST, AUG. 12.

PRESIDENTIAL ADDRESS

of

W. H. ROBERTS, of Newtownards.

Gentlemen,—I take this opportunity of thanking you for the honour done me in electing me to the position of President of our Association. I have often occupied a position for which I felt unfit; but I have never felt that position so acutely as I feel it to-day, and I trust you will bear with me in my shortcomings and overlook any mistakes I may make in carrying out my presidential duties.

VALUE OF THE TECHNICAL PRESS.

It is now twelve years since I had the honour of becoming a member of the Association; and it is very gratifying to me to look back on the prosperity that has been evidenced in the gas profession in that time. I am of opinion that there is no industry in the British Isles that can make a greater claim to advancement with the times than that which we represent to-day. A great deal of this advancement and improvement might well be attributed to the work done at these meetings, coupled with the valuable information obtained weekly from the Technical Journals.

A MISTAKEN IDEA.

There are some who are of opinion that the gas industry has now reached its zenith, and that it will soon be ousted from its present position by competition from other sources. My experience, however, leads me to think the reverse; and I believe that it is the general opinion of those interested in its welfare. A member of the Council I have the honour of serving told me recently that his opinion was that gas would soon be superseded by some other means of lighting. What that other means might be he could not say; but, being of that belief, he thought I was making a great mistake in spending so much money on capital, as, in the event of such new light being introduced, all the new plant on which large sums have been, and are being, spent would have to be disposed of in the form of scrap. I am afraid if this theory were carried out all round the majority of what are at present prosperous places of business would have to close-down, as owners would refuse to instal new plant, lest it should be superseded by something better, at present unknown, on the market.

POSSIBILITIES OF THE INDUSTRY.

I have no hesitation in expressing the opinion that up to the present the profession has only been in its youth, and is now about to attain manhood—if I might be allowed to use the expression in that sense; and I venture to predict that there is a greater future for it than anything yet dreamt of. One can hardly credit that gas is being supplied at least at 20 per cent. less than was charged for it a few years ago, notwithstanding the fact that materials and other expenses have increased over 30 per cent. during the same period.

COAL PRICES.

We have to deplore the ever-increasing price of coal. Its enhanced price affects every industry in the kingdom. It being one of the principal units—I might say the backbone of our industry—we naturally look upon these increases with anxiety, and wonder where they will end. There is, however, one redeeming feature in this that must not be overlooked, and I consider it should lessen our anxiety somewhat about the price of coal—in fact, my opinion is that there need be no anxiety. I will not deny that we may be forced to advance the price of gas if these increases continue; but we must not lose sight of possibilities. With an increase of (say) 100 per cent. in the price of coal, there should not be any reason for the price of gas going up more than 12 to 15 per cent., as we can safely look for a large proportion of the advance in coal being returned by a corresponding increase in the price of residuals, particularly coke. But what about our competitors?

OUR COMPETITORS.

Although we are likely to have an increase of 12 to 15 per cent., our chief competitors—electricity and steam for light and power—in all probability would have to make an increase of anything from 65 to 80 per cent., and as for domestic heating and cooking, the increased cost will be up to 100 per cent. for coal; so that our competitive position will be on a more improved basis than at present. I might also predict that if such increases should occur gradually, the continuation in the improvements that have been taking place in the profession will, in all likelihood, be such that there will be no necessity to increase the price of gas at all.

DISTRIBUTION MATTERS—INCREASED EFFICIENCY.

Another item I might mention is improved methods of distribution, which enable the consumer to obtain a greatly increased efficiency from the same volume of gas. I might here mention that I can foresee drastic changes in present methods of distribution whereby the ordinary consumer will, on his present fittings, be able to obtain about double the lighting efficiency possible under existing conditions. I refer to the distribution of a mixture of gas and air through ordinary mains at about 10-inch pressure, similar to that adopted by the Selas system. This is practicable now that the deficiency in the mains can be so easily maintained by boosting. I feel so confident of this, that the system presents itself to me as being the best and most efficient known method—at least, for Newtownards to adopt—that I have for years made extensions and alterations to both high and low pressure mains with that object in view, to be carried out as soon as opportunity presents itself.

What I mean by opportunity, is whenever Parliament will allow us to adopt the thermal unit value on the sliding-scale in place of candle power as at present. Should we ever have occasion to present another Private Bill for parliamentary sanction, we shall certainly endeavour to have this proviso inserted. So far as mains are concerned, we are ready for this any time. Mr. A. Docking, in the paper that we hope shortly to have the pleasure of hearing, will be able to let you know all the advantages this system will prove to both the supplier and the consumer. One might ask, Why not advocate high pressure as is being practised with 60 inches and over? This has already been adopted and proved to be successful in Newtownards to a limited extent; but I do not think it lends itself so well for general adoption as the other, although my consumers on the high-pressure system feel there is nothing more to be desired.

VERTICAL RETORTS.

A matter of great importance to gas engineers and managers at present is the question of vertical retorts. I feel that those in small works who can stave off the necessity of remodelling or extending their retort-houses for a few years will lose nothing by waiting, as I believe there will be improvements in the design and construction of verticals that will make them more suitable, both in cost and in upkeep, for small works such as are common in Ireland. An installation I had the pleasure of seeing recently struck me as being likely to meet the position in this respect. Not only is it likely to cost considerably less than others I have seen, but the design is so arranged that the machinery necessary is reduced to a minimum. As the installation I refer to will not be ready for work for two months yet, I cannot say anything definite as to its efficiency. What I saw, however, impressed me favourably; and I will take the greatest interest in the results obtained after it has had a trial. There is no doubt as to verticals being a success in large works, as has been experienced in Belfast. The success of the installation in Lurgan is also undoubted.

In Newtownards, we now require to add to our retort capacity, and it has become a question with us whether to extend the present system or instal verticals. Investigations carried out by me, coupled with comparisons I have been able to obtain, do not indicate that we can at present look for any financial gain by installing them in Newtownards. I may say I was disappointed to find that, with the exception of wages, the results to be obtained from verticals appear likely to come out on the wrong side, so far as Newtownards is concerned. It was only on the question of the slight saving in wages that the balance would appear to be at all in favour of verticals; and this is not taking into account the question of the large annual indemnity necessary to meet repayments of capital and interest.

My Committee have the matter still in hand, and, in the event of proof being forthcoming that the advantage both in efficiency and finance are sufficient to warrant the outlay, they will, I know, have the work proceeded with at once. I have not the slightest doubt that, where an entirely new carbonizing plant is required, verticals stand far and away in advance of horizontals; but where efficiency can be obtained such as is experienced in Newtownards, and a small outlay would make the necessary extension to meet requirements for a few years to come, I am afraid the question of verticals is one which would have to lie in abeyance. I am aware that it is a very difficult question indeed to decide, and knowing that a number of the members of the Association are, like myself, anxiously considering this matter, I endeavoured to obtain a paper upon verticals, but was unsuccessful. It is a matter we would have been deeply interested in, and it would have given us an opportunity for an exchange of views which would undoubtedly have been of great assistance to all at the present time.

DIFFICULTIES OF IRISH GAS-WORKS.

Our brethren across the Channel have no conception of the difficulties we have to overcome in Ireland, or the disadvantages we have to contend with; but it is very gratifying to find that, on making comparisons with similar-sized works in England and Scotland, the results come out favourably for the Irish gas undertakings. We have to meet the extra cost of importing all our requirements, and the large percentage of loss in transport. In England and Scotland, screened coal can generally be purchased and delivered into the works in that state; but we in Ireland have to be satisfied with such coal reduced to a state that I am afraid our friends across the Channel would only accept as slack, or a poor sample of through and through. I have for years purchased slack which I concluded might as well be purchased at the lower price in the small condition as at the higher rate; and I have it delivered more or less reduced to a similar state at the works. I know there are very few who agree with me in this, and I know there is a great deal to be said against it, and sometimes I get shaken in my opinion when I see the results obtained in similar works on this side of the Channel; but judging from my own results, I still feel justified in continuing the use of slack.

Unfortunately, few of us can boast of rising towns such as are

to be found in England and Scotland; but it is wonderful what can be done if we put our shoulder to the wheel and make the best of our circumstances. Although Newtownards has a population but slightly increased from what it was twenty years ago, the output of gas has increased, even in my time, from 13 million cubic feet to 45 millions; and I do not hesitate to say that, in the course of a few years, I do not anticipate any difficulty in adding another 10 to 15 millions to this. I am pleased to say that the last few years have shown a decided improvement in the trade of the town, and as a result there is every prospect of a very speedy increase in the population. Mr. R. Bruce Anderson pointed out a few years ago that the valuation per head of population had a decided influence on the price at which gas can be supplied. Towns with a high valuation per head would naturally have a wealthier class of consumers, which makes a vast difference in distribution and collection costs. Most towns in Ireland are unfortunately placed in this respect, and Newtownards particularly so.

CONCLUSION.

As we have a very interesting and instructive lecture to look forward to from Mr. Abady and a paper from Mr. Docking, I will not take up the valuable time at our disposal further than to express the pleasure I had in being present at what I believe to be an historical event which took place at Lugar—the unveiling of a tablet in honour of William Murdoch, the inventor of gas lighting. The tablet is placed upon the wall of the house in which he was born, and near to the cave where he first made coal gas. As you have all had an opportunity of reading the remarks by Mr. Hislop, of Paisley, I need not comment further than express how pleased I was to have the opportunity of being present at such an event.

Those who we hope to have the pleasure of accompanying tomorrow on our Association annual excursion will have an opportunity of seeing what is being done in Newtownards. I do not think we have anything special to show that is not in accordance with the usual practices as adopted in most up-to-date gas-works. My principle has always been to learn what is taking place, consider its adaptability to our own requirements—particularly from a financial point of view, and, if satisfied on this point, we have usually gone in for it; and in doing so, I may say we have not always installed the latest. One of the most recent improvements made is in regard to purifiers. Whereas under the old conditions with small purifiers and lime we would sometimes have had to change twice a week, with the new installation, with oxide purification, we were able to run for two years with only one change to each of the three purifiers—the last of the series running the full two years without changing.

We welcome any who may avail themselves of the opportunity of inspecting the works before leaving for Belfast, after what I hope will be an enjoyable day's outing.

CONDITIONS AFFECTING EXPLOSIONS OF COAL GAS AND AIR.

By E. L. Sellars, M.Sc., and C. Campbell, M.Sc.

This is a memoir which was submitted to the Manchester Section of the Society of Chemical Industry; and it is reproduced from the number of the Society's "Journal" for the 31st of July. The experiments described in it were suggested by Professor Harold B. Dixon, F.R.S., and were carried out in his research laboratory. The object of the investigation was to obtain some further knowledge of explosions in coal mines by carrying out explosions on a small scale. The memoir is divided into two parts, the first being by the above-named authors. We give this below; reserving the remainder for a subsequent issue.

The classical researches of Berthelot, Mallard and Le Chatelier, and Dixon have thrown light on the behaviour of explosions in various gaseous mixtures in which the explosion "wave" is set up; but little has been done in the case of mixtures where the propagation is very slow. Mallard and Le Chatelier partially studied the explosions in mixtures of coal gas with air; but the tubes they used were never longer than 4 metres, nor wider than 30 millimetres. They devised several methods of measuring the rates of explosion, but none were satisfactory for practical purposes. In the explosions studied in this work, the explosion wave is never set up, and, as a rule, the flame travels at such a rate that it can be followed by the eye. The coal gas was found to vary in composition somewhat from day to day; but by making in a large gasholder sufficient gas mixture for each set of comparative experiments, this variation did not affect the results.

Part I.

The propagation of the explosions was effected in glass tubes of lengths varying from 4 to 18 metres. Such a tube was made up of shorter tubes (1½ metres long), all of the same diameter, joined together by rubber bands. For measuring the rate of propagation, the tube was marked at every metre. To time the flame as it passed each mark, a drum, round which a piece of smoked paper was fixed, was employed. A pointer attached to a small rod of soft iron which could be attracted by a small electro-magnet was adjusted so that the point traced a fine line on the paper when the drum revolved. The magnet was connected with an accumulator by wires; a tapping key being interposed, so that an instantaneous "make" or "break" could be performed by pressing down or releasing the tapping knob. As the flame passed each metre mark, the key was momentarily tapped; the circuit was thus completed, the rod of soft iron attracted, and the pointer made an upward mark on the revolving drum. To ensure that the drum revolved at a constant rate, the times for one revolution before and after each experiment were determined by means of a stop-watch. Unless these were the same to within a fraction of a second, the experiment was rejected. Knowing the distance between the marks recorded by the pointer on the drum, and the circumference and the time required for one complete revolution of the drum, the time taken by the flame to travel from one metre mark to another could be calculated.

I.—Experiments to Determine the Distance the Flame Travels under Various Conditions.

(1) *Sparking Near an Open End, the Farther End of the Tube being Closed.*—Experiments were conducted in tubes of lengths 3 m. to 18 m., and of diameters 12 mm., 24 mm., and 44 mm.; and in all these cases the flame travelled the whole length of the tube. In one case where the farther end was closed during the experiment, as before, but the end at which the flame is started was closed immediately after ignition, the flame again travelled the whole length of the tube.

(2) *Sparking Near an Open End, the Farther End being Open.*—It was found that, unless the tube was very short (*e.g.*, 3 m., in which case the flame shot out of the further end of the tube), the flame never travelled the full length. In a set of experiments in which the length of the tube was 12 m., the flame died-out at the tenth metre. The reason for this is doubtless that as the flame travels from the starting-point, gas issues from, and air enters, the farther end; making a certain portion of the gas mixture non-explosive. If the tube be short, the flame reaches the end before the gas has time to escape, and consequently shoots out of the end of the tube. If, instead of leaving open the end near which the gas was fired, it was closed immediately after ignition, it was found that the distance the flame travelled was greatly diminished. Using a tube 12 m. long and 24 mm. wide, the flame travelled 3½ m. only under these conditions; whereas when the end near which the mixture was fired was left open during the experiment, the flame travelled 10 m.

(3) *Sparking Near a Closed End, the Farther End being Closed.*—The explosions when carried out under these conditions were accompanied by some violence. The flame travelled the whole length of the tube.

(4) *Sparking Near a Closed End, the Farther End being Open.*—The flame propagated under these conditions travelled very rapidly. It did not, except in the case of short tubes (*e.g.*, 4 m. long) travel the whole length of the tube. Using a tube 12 m. long and 24 mm. wide, the flame died-out at the seventh metre.

(5) *Effect of Length and Diameter of the Tube on the Distance the Flame Travels.* (i.) *Sparking near an Open End, the Farther End being Open.*—The results show that the increase in length of the tube means an increase in the distance the flame travels, though this distance does not appear to bear any proportionate relation to the length of the tube.

Length of Tube. Metres.	Distance Flame Travels. Metres.
6·0	5·5
12·0	9·0
17·5	12·0

Experiments show that the effect of increasing the diameter of the tube is to diminish somewhat the distance the flame travels under the above conditions.

Mixture 12 per Cent. Coal Gas; Length of Tubes, 12 Metres.

Diameter. Millimetres.	Distance Flame Travels. Metres.
12	11·0
24	10·5
44	9·0

(ii). *Sparking Near a Closed End, the Farther End being Open.*—The flame travels somewhat farther in a wide tube than in a narrow one.

Mixture 10 per Cent. Coal Gas; Length of Tubes, 5 Metres.

Diameter. Millimetres.	Distance Flame Travels. Metres.
24	3·3
37	4·0
44	5·5

II.—The Manner in which the Explosions are Propagated under Various Conditions.

The tube used was 12 m. long and 24 mm. wide. The distance of the sparking wires from the end of the tube was 11 c. With

the exception of a lead bend comprising the seventh metre, the tube consisted of lengths of glass tubes joined by rubber bands. It was set up so as to be inclined from the horizontal. The gas mixture used contained 12 per cent. of gas coal.

The tube was filled with explosive mixture, and the explosion observed under each of the following conditions of the tube:

1.—Sparking near an open end, the farther end being closed.
2.—Sparking near an open end, the farther end being open.
3.—Igniting by the flame of a taper at an open end, this end being closed just after ignition, and the farther end being closed during the experiment. [In the case of the farther end being open during the experiment, the flame did not travel a sufficient distance for its progress to be traced.]
4.—Sparking near a closed end, the farther end being open.
5.—Sparking near a closed end, the farther end being closed.

1.—A number of experiments show that the flame starts at a uniform rate, with a steady motion for about 4 m. Small oscillations then begin, and the rate appears to be slightly increased. This state continues to the sixth metre. This may be called the "Initial Uniform Period." From the sixth to the eleventh metre, the oscillations suddenly increase in magnitude, and the propagation is accompanied by violence and a loud cracking noise. The rate of propagation, too, is simultaneously suddenly increased. This period may be called the "Period of Maximum Velocity." At the eleventh metre the flame assumes its original character, travelling steadily, and at a uniform rate. This continues to the end of the tube. This period may be called the "Final Uniform Period."

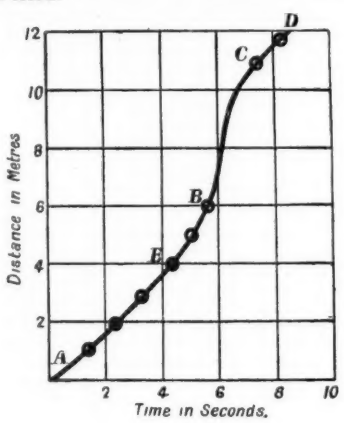


Fig. 1.

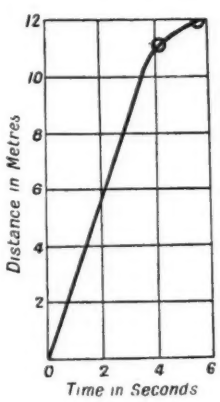


Fig. 3.

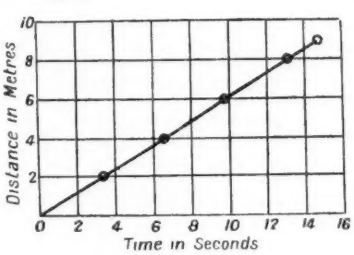


Fig. 2.

Fig. 1 illustrates the progress of the flame propagated under the above conditions. A B represents the initial uniform period; E being the point at which the oscillations begin to be apparent. B C represents the period of maximum velocity; and C D the final uniform period.

2.—Experiments show that the flame starts at a uniform rate as before for about 4 metres; small oscillations are then seen which increase in magnitude, and just before the flame goes out are very violent. The period of maximum velocity, present in No. 1, is absent. The flame advances at approximately the same rate throughout.

(3) The flame travels in a manner very similar to that described in No. 1; the progress apparently being little affected by closing the end after igniting the gas mixture.

(4) The manner in which the flame propagates itself is very different from that in previous cases. With mixtures containing about 12 per cent. of coal gas, the flame travelled at a very rapid rate, and was accompanied by considerable violence. It was impossible to trace the progress of the flame metre by metre, even by using mixtures containing a less percentage of coal gas.

(5) Explosions which otherwise are very feeble, under these conditions become very violent; and it was only after considerable difficulty that it was shown that the flame travels at a great velocity for about 11 m., and then finishes its course to the end of the tube with suddenly diminished velocity. The progress of the flame is shown in fig. 3.

III.—On the "Initial Velocity" of the Flame produced in Mixtures of Coal Gas and Air.

By the "initial velocity" is meant the velocity with which the flame travels through the portion of the initial uniform period where oscillations have not begun. As shown by Mallard and Le Chatelier, the duration of this steady period increases with increased length of the tube to a certain extent. In a tube 12 m. long, the flame possesses this steady character for at least 3 m.; but in a tube the same diameter and 4 m. long, this initial period only exists during the first metre of the progress of the flame.

Effect of the Diameter of the Tube on the Initial Velocity.—The tubes used were of the following dimensions: (1) Length, 11·6 m.; diameter, 44 mm. (2) Length, 12 m.; diameter, 24 mm. Mixture, 10 per cent. coal gas.

(i.) *Sparking Near an Open End of the Tube, the Farther End being Closed.*—The effect of the diameter of the tube on the initial velocity is apparent if the gas mixture in the two tubes is sparked at the same instant. The flame in the wider tube very soon outdistances that in the narrower tube. To determine the relative initial velocities, the flame in each tube was studied separately, and was timed at the end of every ¼ m. interval. The results show that an increase in the diameter of the tube causes an increase in the initial velocity of the flame.

The following table shows how the time taken by the flame in travelling the first 2 metres is less in the wide tube than in the narrow one; and this difference in the initial velocity increases as the flame progresses.

Distance in Metres.	Time in Seconds. Diam. 44 mm.	Diam. 24 mm.
0·25.	0·52	0·57
0·50.	1·08	1·23
0·75.	1·53	2·02
1·00.	2·05	2·70
1·25.	2·58	3·40
1·50.	3·21	4·14
1·75.	3·78	4·80
2·00.	4·33	5·86

(ii.) *Sparking Near an Open End, the Farther End being Open.*—Increase in diameter of the tube means an increase in the initial velocity of a flame started under these conditions.

Distance in Metres.	Time in Seconds. Diam. 44 mm.	Diam. 24 mm.
0·25.	0·44	0·65
0·50.	0·87	1·28
0·75.	1·30	1·95
1·00.	1·90	2·57
1·25.	2·41	3·19
1·50.	2·96	4·07
1·75.	3·47	4 80
2·00.	3·95	5·65

Effect of Having the Farther End of the Tube Open on the Initial Velocity of a Flame Produced by Sparking Near an Open End.—The tube used was of the following dimensions: Length, 11·7 m.; diameter, 24 mm. Mixture, 10 per cent. coal gas.

A set of experiments was very carefully carried out, and the results show that the effect on the initial velocity of having the farther end closed or open is very slight. It appears that if that end is open the initial velocity is less than if it were closed. This slight difference is more pronounced if the tube used is shorter (*e.g.*, 4·3 m.).

Distance in Metres.	*Length of Tube, 11·7 Metres.* Time in Seconds. Farther End Open.	Farther End Closed.	*Length of Tube, 4·3 Metres.* Time in Seconds. Farther End Open.	Farther End Closed.
0·25.	0·85	0·75	0·55	0·52
0·50.	1·80	1·70	1·10	0 90
0·75.	2·75	2·55	1·80	1·40
1·00.	3·55	3·42	2·70	2·00
1·25.	4·35	4·35		
1·50.	5·25	5·25		
1·75.	6·20	6·05		
2·00.	7·05	7·05		

Effect of Length of Tube on the Initial Velocity.—The tubes used were of the following dimensions: (1) Length, 4·3 m.; diameter, 24 mm. (2) Length, 12 m.; diameter, 24 mm. Mixture, 10 per cent. coal gas.

(i.) *Sparking Near an Open End, the Farther End being Closed.*—The results of several experiments show that an increase in the length of the tube causes the initial velocity to be slightly diminished. [See Table A.]

(ii.) *Sparking Near an Open End, the Farther End being Open.*—Increase in the length of the tube has little effect on the initial velocity under these conditions. [See Table B.]

Distance in Metres.	A.—Time in Seconds. Length 4·3 m.	Length 11·7 m.	B.—Time in Seconds. Length 4·3 m.	Length 11·7 m.
0·25.	0·65	0·80	0 82	0·80
0·50.	1·50	1·76	1·86	1·76
0 75.	2·30	2·66	2·60	2·77
1·00.	3·40	3·60	3·62	3·52

Summary of Results on Initial Velocities.

I.—Increase in the diameter of the tube means an increase in the initial velocity of a flame started by sparking near an open end of a tube, whether the farther end be open or closed.

II.—The effect of increasing the length of the tube, keeping the diameter constant, on the initial velocity of a flame produced by sparking near an open end is, in the case of

the farther end being closed, to cause a slight decrease. In the case of the farther end being open, the length has no effect.

III.—If the flame is started by sparking near an open end, the fact of the further end being closed causes the initial velocity to be slightly greater than it would be if the farther end were open.

IV.—The initial velocity is fairly constant.

SAFE DISTILLATION OF CARBON BISULPHIDE IN THE LABORATORY.

By A. Renfred Myhill, of Birmingham.

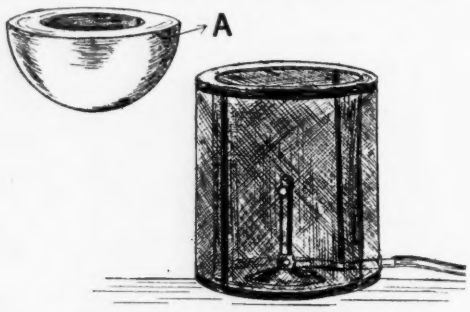
In a gas-works laboratory, it is frequently necessary to distil carbon bisulphide—as, for example, in the case of spent oxide testing and other experimental work involving the extraction of tar or sulphur. Anyone who has had experience of this kind of work knows the great difficulty of preventing the volatile liquid from catching fire during distillation.

To boil CS_2 in a flask over a bare flame is to court disaster. The temperature at which ebullition takes place is so low that a bunsen flame—even when turned so low as to light-back—will in many cases cause such violent boiling as to blow out the cork of the flask and allow the vapour, which is very heavy, to catch fire. Even if this does not take place, it will be found difficult to prevent slight leakage of vapour round the cork, as CS_2 (like paraffin) permeates and penetrates almost anything.

It is hardly safe to say that there is any really reliable preventative of fire when distilling carbon bisulphide. There is scarcely an operator of any experience who, at some time or other, has not had a fire when using CS_2. In a large and important laboratory in the Midlands, a special steam service is laid on for the purpose of such distillations.

Carbon bisulphide distils at a temperature considerably below that of steam; so that it is only necessary to place the flask or retort on a bath through which steam is passing in order to effect ebullition.

Even in the absence of a flame, fires have frequently taken place when using this installation. The writer has it on very high authority that steam at 100° C. is capable of setting fire to CS_2 vapour, and many accidents owe their origin to this cause.



The apparatus shown in the diagram (which was designed as the result of a visit to the hospital after a fire) has been used with complete success in a small laboratory where no steam is laid on. Its construction is very simple. The main portion of the apparatus is merely a cage, made of fine gauze stretched over and riveted on to a metal framework. The gauze used is iron. Doubtless copper would be more serviceable, although it has not so far been tried. Two sheets are employed—one concentric with the other, and about ½ inch from it. The two sheets are joined top and bottom by rings of brass or other suitable metal. The mesh of the gauze is the same as that used for miners' safety lamps; and the two gauzes will be found to be rather a necessity than a luxury, as the flame sometimes passes through one thickness.

Near the bottom of the cage, a short piece of ¼-inch copper tube is let in, so as to allow a bunsen burner inside to be connected-up to a source of gas supply. A hemispherical copper bath, of the shape shown at A, rests on the open top of the cage. It should be a good fit; so as not to allow any of the flame underneath to ascend, or any CS_2 vapour to descend into the middle of the gauze cylinder.

A is filled with water; the bunsen burner lighted; and the flask of CS_2 or extract placed in the water. It is not necessary to boil the water in the bath, as the whole of the distillation takes place below the temperature required to do this. As soon as the water shows signs of reaching the boiling point, the flame is lowered, or, if the volume of CS_2 is small, turned out altogether, when the heat will cause all the solvent to boil away gently and without danger.

Drought in South Wales.—No rain has fallen over a large area of South Wales since the 21st ult., when a rainfall of 0·07 inch was recorded at Cardiff, while the previous rainfall was 0·31 inch on July 6. The Cardiff reservoirs still furnish an unrestricted supply; but in the hill districts of Glamorgan the people are suffering from drought, and in many cases have to go long distances for water.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Waltham Abbey Carbonizing Experiences.

Sir,—As Mr. Randall fails to supply the reasonable information I have asked for, and now (very belatedly) seeks the privacy of the committee room for the further discussion of this matter, there is nothing more to be said. But I have no doubt your readers will draw their own conclusions from the attitude he now sees fit to adopt.

F. J. Bywater,
Hon Sec., Refractory Materials Committee.

Aug. 9, 1913.

LEGAL INTELLIGENCE.

MOTOR-CAR DRIVERS AND PUBLIC LIGHTING.

The South African Lighting Association have lately come out victorious in an action brought against them for damages amounting to £175, claimed by a Mr. Lutman-Johnson on account of an accident to a motor-car driven by him in February last. It was contended in support of the claim that the Company were guilty of negligence in not lighting or keeping alight the lamp with the post of which the car collided. Though much evidence was adduced to the effect that the lamp was not alight, numerous witnesses living in the vicinity were positive that it was burning at 10.45 p.m. Assuming that, for some unexplained reason, the light was extinguished between 11 p.m. and 11.35 p.m., it was difficult to say what steps defendants could have taken to avoid it. This was the view held by the Judge-President (the Hon. Mr. Justice Graham) in giving his decision. On a question of negligence, every case must, he said, be decided on the circumstances surrounding it. If the lamp had been lit, the accident would never have occurred. But, assuming that it was extinguished, this did not relieve the plaintiff from the necessity of exercising due and proper care in the management and control of his car; and if his own carelessness was a determining factor of his injury, he could not succeed in his action. The question arose whether he did exercise the ordinary amount of care and prudence which the circumstances demanded. He was well acquainted with the streets, and if, when he entered the one in which the accident occurred, he had kept to his proper side of the road, he would have had a wide area in which to proceed with safety. Further, had he justified his conduct in not relying upon his own lamps, but upon the assumption that in the streets of a town a driver can rely entirely on the street lamps? It appeared to him (the Judge-President) that if a driver did not depend upon his own lamps he might just as well not have any. If the plaintiff had exercised ordinary prudence by using his lamps for the purpose for which they were provided, the accident would probably not have occurred. It had been admitted during the hearing of the case that if the plaintiff had been keeping a proper look-out he would have seen the lamp-post and the guard-stones protecting it, in spite of the fact that the light was out; and he (the Judge-President) agreed with this view. He thought the plaintiff was not justified in relying upon the street-lamps, and that generally it was his own carelessness which was the determining cause of the accident. For these reasons, his judgment would be for defendants, with costs.

Dr. Leibbrand and Felixstowe Electric Lighting.

At the Town Hall, Felixstowe, last Wednesday, Mr. H. R. Hooper, M.Inst.C.E., held an inquiry into an application made to the Local Government Board by the Felixstowe and Walton Urban District Council for sanction to borrow £4729 for the extension of the electric lighting plant. Details of the proposed expenditure having been given, the application was amended in certain particulars. On the Inspector asking if anyone opposed, Dr. Leibbrand said he did; his reason being that the application was premature. He expressed the belief that if a poll of the ratepayers were taken, five-sixths of them would oppose spending any more money, especially as there was a proposal to purchase the entire undertaking. According to the figures submitted to the Inspector, it was obvious that the increase did not justify the expenditure; and if the concern could not be sold, the additional burden would be too great. If the Company responsible for the supply could not carry out their agreement, the Council must bear the burden. He would shortly have the privilege of approaching the Local Government Board and the Board of Trade with a definite scheme of purchase, with references and all particulars. The Inspector said he did propose to deal with this question; and he asked Mr. Humphrey (the Clerk to the Council) if he had anything to say as to the opposition. Mr. Humphrey said it came rather as a surprise to find Dr. Leibbrand opposing the scheme, which was put forward in February, when he was practically running the Company. His position seemed inconsistent. Dr. Leibbrand said that was quite correct; but his object in February was to try to show the Council what liability they had undertaken. This also was the object of the litigation he commenced. The inquiry then closed.

Northampton Gas Company.—The Directors' report which was submitted at the recent annual meeting of the Northampton Gas Company stated that the net profits for the year available for distribution were £13,530. The maximum dividend of 5 per cent. on the consolidated stock was declared, leaving £1562 to be carried forward. To meet the growing demand for gas, vertical retorts are being installed, for which further capital will be necessary. The report was adopted; and at a subsequent extraordinary meeting the Board were empowered to raise £40,000 by the issue of additional stock.

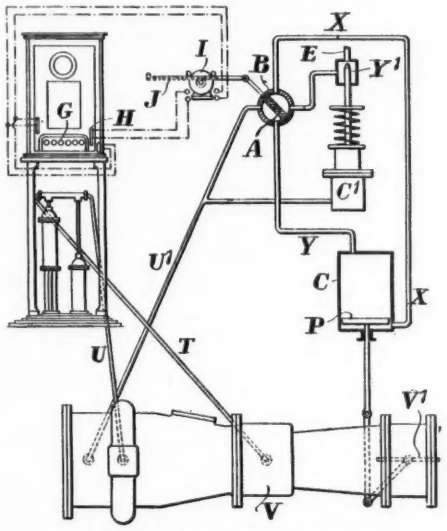
REGISTER OF PATENTS.

Controlling the Flow of Water in Mains.

KENT, W. G., of High Holborn, W.C.

No. 11,608; May 15, 1912. Re-dated Nov. 15, 1912.

The object of this invention is "to provide means for shutting a valve in a water-main when any predetermined quantity of water has passed." The valve is actuated by "a piston working in a hydraulic cylinder to which pressure is admitted through a valve operated by the counter of a meter which registers the flow of water in the main."



Kent's Controller of the Flow of Water in Mains.

In the arrangement illustrated V is a venturi tube, from the upstream and throat of which pipes U T lead to a counter G which actuates an elastic device H which, on the predetermined quantity being reached, starts a motor I which traverses a rack J and reverses the valve A, into the casing B of which open a pipe U^1 from the main, an exhaust pipe E, and pipes X Y, leading to the two ends of a cylinder C, the piston P of which is connected to a butterfly valve V^1 in the tube V.

In order to prevent the too rapid closing of the valve when the flow is very rapid and therefore the pressure in the main high, the pipe U^1 may introduce pressure beneath a spring-loaded cylinder C^1, which piston actuates a needle valve Y^1 in the exhaust pipe.

Normally the parts are in the position shown, and the pressure from the pipe U^1 through the valve casing B and pipe Y holds the piston P down and the valve V^1 open. But when the valve A is thrown over, it puts X into communication with U^1 and Y into communication with C, so that the piston P is raised and closes the valve. Should, however, the pressure in P be dangerously high, the valve Y^1 will be raised, and the exhaust from above piston P through the pipe Y will be throttles, and further movement of V^1 will be prevented until the pressure had dropped.

Compressing Air or Gas on Gas Lamps for Lighting Purposes.

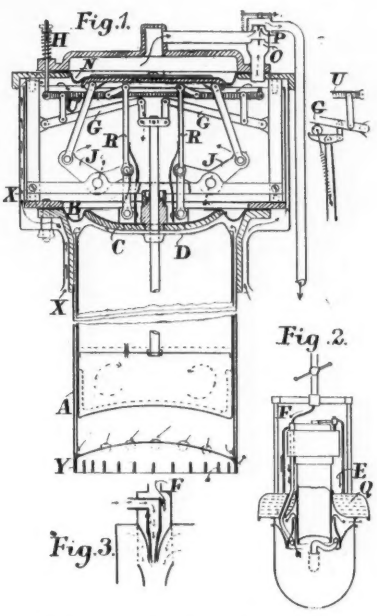
MERRICK, S. C., of Hornsey, N.

No. 15,665; July 4, 1912.

This invention relates to the compressing of elastic fluids for use in combination with gas-lamps using incandescent mantles.

Hitherto in such apparatus, says the patentee, compression has been effected by expanding by heat the air or gas to be compressed and thereby ejecting it into the service at a pressure above that of the atmosphere, or else the expansion and contraction within a cylinder of a fixed quantity of elastic fluid has been used to operate a supplementary pump to effect the increased pressure. It has also been proposed to use a small hot-air engine to be operated by the waste heat of the lamps, and thereby work a supplementary pump. It has, moreover, been a frequent practice in gas lighting to put a complete service under pressure by installing gas or hot-air pumps or blowers, and in one type a hot-air motor has been used comprising a displacer within a cylinder (specially heated at one end and left cold at the other) which effects pumping by lifting a weight or by contracting springs on the vacuum stroke—subsequently compressing the elastic fluid by the return of springs or weights. In one form of this machine the displacer is operated by a spring motor kept wound by a reciprocating part of the main motor, and giving the displacer a definite stroke by the rotation of a shaft on the spring motor.

In the present invention, the object is "to compress elastic fluid immediately by means of an incandescent gas-lamp, in order to obtain the necessary driving power without extra cost by utilizing the heat in the products of combustion to effect the necessary motion by vacuum obtained by the cooling of a preheated body of air, and, further, to combine or arrange the parts in a sufficiently compact and simple manner as to permit of their ready employment upon a gas-lamp."



Merrick's Compressed Air and Gas Lamp.

The essence of the invention lies in "the means for operating a displacer by levers connected with the motor (whereby the position of the former is rapidly changed at the end of the stroke of the latter) in an apparatus operated by a hot-air motor of the type which works on the vacuum stroke only, and which derives its power from the waste heat arising from the burner and mantle above which it is mounted, and to which it supplies elastic fluid under pressure by the action of a pumd driven by the said motor."

Fig. 1 is a vertical section through a part of the apparatus showing the working elements; the displacer being at the top of its stroke and the pump ready for starting delivery. Fig. 2 is a general view with the lower part of the apparatus in the vicinity of the burner shown in section. Fig. 3 is a section of a convenient form of combination air and gas nipple.

In the form shown in fig. 1, there is placed over the vicinity of the burner a cylinder A, closed permanently at the bottom and having at the top a flexible diaphragm B attached to a disc C. Within the cylinder is a short displacer D with a centre rod passing up through a gland in the disc and carried by cross levers G, which extend to suspending springs H at the sides of the cylinder. Bridge pieces spanning the diaphragm carry a pair of bell-cranks J, one end of each being linked by bars to the diaphragm disc. The other ends are linked upwardly to a similar disc and diaphragm N, immediately overhead, over which is mounted a saucer-like backing for the second diaphragm, which thereby forms a pump when the first diaphragm is operated by variations in absolute pressure in the cylinder, following the transfer of air from the lower or hot end to the upper or cold end, and *vice versâ*, by the displacer movement.

By the peculiar arrangement of the bell cranks, the pulling down of the first or power diaphragm causes the pushing up of the second or pumping diaphragm, which is then, by valves O and P, delivering air or gas (previously drawn in) into a reservoir Q (fig. 2). At the same time, by the relative angles of the arms of the bell cranks, the mechanical advantage of the power diaphragm increases as its stroke progresses and its power falls off.

The links R are attached to short toggle links and pressed upon by springs, which cause the side spring bar U to be depressed when the diaphragm C is fully raised. Response to this depressing action causes the displacer to fall. Vacuum follows in the cylinder, driving down the disc C and thereby causing the links R to follow until they get below the level of their attachment to the bar U, which they then tend to force upwards by the displacer being thereby raised and killing the vacuum and producing pressure, which in its effect on the disc C lifts it up and causes a repetition of the motion.

In order to secure effective cooling of the upper port of the cylinder, the head embracing the two diaphragms is enclosed; air (under the variation of capacity following the diaphragm movements) being forced, as shown by the arrows, to pass over the cylinder head by creating an annular passage way X. In the lower or heated end a metal skirt Y hangs below the bottom, so that the heat may be carried by the conductivity of the metal into the body of the bottom end of the cylinder —thus keeping the metal only at a very high temperature in the hottest zone.

The displacer is divided into two sections, to prevent heat creeping from the lower to the upper end, and only such connections are made between the sections, by a fine bore pipe, as will allow the pressure to equalize but will prevent a free circulation of air by which convection currents transfer heat.

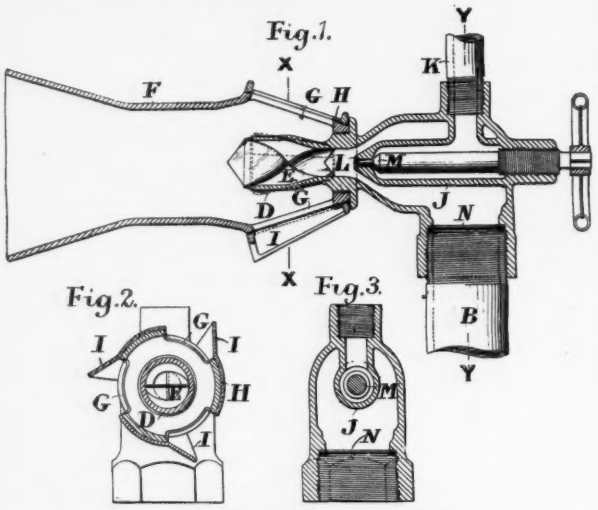
The air or gas may be led to any suitable burner, and is preferably heated just prior to combustion. This may be effected if air is compressed as indicated in fig. 2; the arrow E showing air under pressure being forced into the reservoir Q, from which it passes to the combination nipple shown in fig. 3. In conjunction with the gas, as shown by the arrow F, it enters a burner mounted within the enclosed head of the machine clear of the working mechanism, and delivers the mixture to the burner below through a heating coil, which, by the baffles, receives the products of combustion.

Atmospheric Gas-Burners.

HUNTER, C. M., of Lombard Street, E.C.

No. 16,173; July 10, 1912.

This invention relates to burners of the type wherein a jet of gas is injected by means of gas or steam under pressure into one end of a tube or passage adjacent to a series of openings in the latter, in such a manner that a current of air is induced through the openings and becomes mixed with the gas previous to reaching the point of ignition at or near the other end of the pipe or passage.



Hunter's Atmospheric Gas-Burner.

Fig. 1 is a sectional elevation of the burner, fig. 2 is a section on the line X, and fig. 3 is a section on the line Y.

The body of the burner is adapted for attachment to a gas supply pipe B, and D is the nozzle or throat through which the gas issues. It is here shown formed integral with the body. E is a spiral blade arranged within the nozzle, and serving to impart to the gas, as it issues, a gyratory or whirling motion. F is a trumpet-shaped mouth, screwed on to the nozzle or the body. It tapers or flares outwardly to correspond approximately with the surface of the gas as it passes, and is of such diameter that the gas, when passing, will practically fill the trumpet and prevent ingress of air between the gas and the inner surface of the trumpet. G are the air inlet apertures formed around the trumpet adjacent to the gas-nozzle, and H is a sleeve provided with corresponding openings, and adapted to be rotated so as to regulate the area of the apertures—the apertures in the sleeve being preferably formed with tangential plates I, so that air, as it flows through the apertures into the trumpet, will have a rotary motion imparted to it which will facilitate its admixture with the gas.

The ejector comprises the tube J within the body of the burner, and adapted to be connected with a steam pipe K. It has a nozzle L in axial alignment with the nozzle D and having arranged within it a valve M, the stem of which is screwed into the burner body for regulating the position of the valve and the consequent flow of steam or the like into the burner nozzle.

In operation, the gas is first turned on sufficiently to ignite it; the sleeve H being rotated to close the air-supply apertures G. As the gas is gradually turned on more fully and the velocity of the flame is increased, the air supply is opened—the position of the sleeve being adjusted to regulate the air supply.

It is advisable, the patentee remarks, to attach a water pressure-gauge to the gas-supply pipe, so as to indicate the pressure in the main and to facilitate the control or regulation of the gas and steam supply when the steam is admitted.

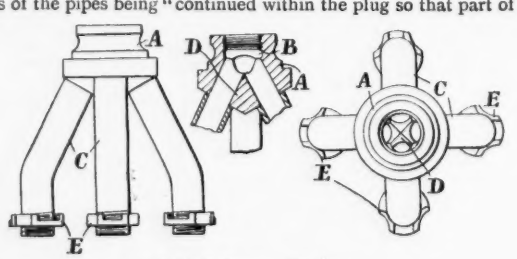
In order to prevent danger from back-firing, a gauze damper N is inserted in the gas inlet branch.

Bunsen Burners.

ROBIN, J. I., of Great Titchfield Street, W.

No. 16,487; July 15, 1912.

This invention consists of a plug adapted to be fitted to any standard burner attachment, a mixing-chamber or the like, and a plurality of pipes fitting into the plug and arranged in an inclined manner—the bores of the pipes being "continued within the plug so that part of the



Robin's Bunsen Burner.

plug between the pipes takes the form of a sharp solid point situated centrally in the path of the entering stream of gas or gaseous mixture, so that the gas or gaseous mixture impinges thereupon and is thereby equally and uniformly distributed to the plurality of pipes."

In a burner for incandescent lighting, the fitting is in the form of a plug A, having a recess B of such a size that it may be readily fitted to any standard form of burner attachment or mixing-chamber. Into the plug are fitted three or more pipes C, communicating with the interior of the plug, and being inclined to one another so that the adjacent edges of the bores continued within the plug at the portion where they meet the lower face of the recess in the plug form a sharp point D. In this way, "little or no resistance is offered thereby to the passage of the gas or gas mixture, which is evenly distributed among the various pipes comprised in the burner." When the burner is required for lighting, the free ends of the pipes C are provided with any usual form of attachment or mantle support C.

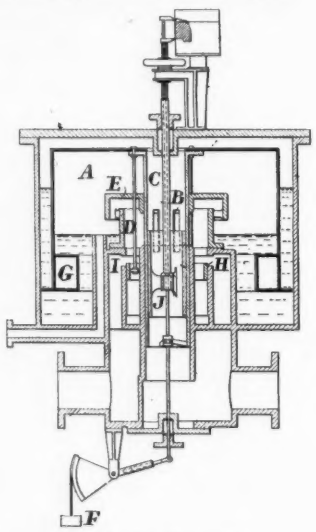
Measuring Gases, Vapours, and Liquids.

LIESE, H., of Hamburg.

No. 23,656; Oct. 16, 1912. Convention date, Oct. 16, 1911.

This invention relates to improvements in the apparatus described in patent No. 27,467 of 1911. The object of one part of the improvements is to provide means whereby the inlet or outlet valve of a meter, adjusted to deliver up to a certain maximum quantity, is throttled when the expansion chamber moves beyond a certain point; while the object of another part of the improvements is to provide means whereby sure or certain measurement is secured in cases where, under definite circumstances, higher demands are made on the measuring apparatus than the maximum it is adapted to measure.

In the illustration, as in the 1911 patent, a bell is used as the movable expansion chamber, and a hollow slide-valve as the measuring element; although, instead of a bell, a diaphragm, rotary piston, membrane, or the like may serve the same purpose.



Liese's Gas-Measurer.

The casing shown contains a bell A with slide-valves attached. The gas being measured flows to the measuring ports B of the slide-valve C. The annular channel D has the same sectional area as the slide-valve. Owing to this equal sectional area of C and D, the loss of pressure upwards in D on the whole length of the port B is exactly equal to the increase of pressure downwards in C, and the fall of pressure remains equal at all positions of the port. The baffle-plate E serves to deaden the shock of the flow under the bell, and also as a bearing and guide for the bell. Above the bell, or any other movable expansion chamber which may be employed, a pressure prevails continuously slightly higher than in the highest part of the slide-valve; and this higher pressure depends upon the size of the cover of the bell, and the weight of the moving parts, which latter can be altered by supplementary weight F, or by the float G fixed to the bell. By this weight is fixed the magnitude of the fall of pressure between D and C, and consequently the speed of flow of the gas being measured. When, on full opening of the ports B, the quantity passing reaches the predetermined maximum defined by the product of the size of the opening and the speed of the gas current being measured, the slide-valve H will have been raised by the bell so as to throttle the passage at I in such a manner that not more than the maximum quantity is allowed to pass. If a quantity of gases is to be measured, a measuring opening of constant size is sufficient, and the time taken in passing indicates the quantity. To enable any desired maximum to be fixed, the sleeve-valve J is moved, whereby the free passage of the ports B is limited. On the one hand, the maximum can be fixed by the weight F, and, on the other hand, by the slide-valve H.

Automatic Control Gas and Water Valves.

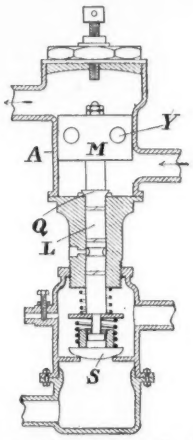
BROWN, W. H., of Battersea, S.W.

No. 29,893; Dec. 28, 1912.

This valve is intended more particularly, but not exclusively, for use in connection with hot water geysers and the like; the object being to provide an apparatus which will have less friction and be less liable to leakage than is at present attainable, and which will also ensure the effective shutting-off of the gas when the geyser is not in use, and "thus contribute to safety and economy."

The invention belongs to the class which comprises a water-chamber connected with a gas-chamber by a stem within which works a spring-controlled spindle connecting the water and gas valves; and the in-

vention consists in the formation of the stem and the spindle inside it, whereby they act as an additional valve between the water and gas chambers. There are also included in the invention (1) a pilot light in the gas-chamber; (2) means for preventing leakage between the two chambers; and (3) means for regulating the movement of the plunger in the water-chamber.



Brown's Gas and Water Controller for Geysers.

The action of the apparatus shown is as follows: When the water enters the chamber A, it lifts the plunger M to the extent permitted by the adjustment, and thence passes through apertures Y in the plunger to the outlet; the motion of the plunger being simultaneously transmitted by the spindle L to the gas-valve S, which at once leaves its seating and allows the gas to escape to the burners. During these operations the mushroom valve Q leaves its seating; but the snug fit of the spindle L prevents any leakage, so that no water can reach the gas-chamber and cause blockage. When sufficient water has been drawn from the geyser, the pressure under the plunger is reduced by closing the stop-cock; and the valve Q is at once pulled down into its seat by the spring, and the valve in the gas-chamber shuts off the supply.

Controlling the Gas Supply to Stoves and the Like.

SMITH, G., of Stratford, Essex.

No. 530; Jan. 8, 1913.

This apparatus, when set in action, operates a gas cock to start a water-heating appliance, so that, when a predetermined amount is boiled, it pours into an adjacent receptacle, and the weight of this operates to cut off the heat supply—an alarm device being put into operation (if desired) at this juncture.

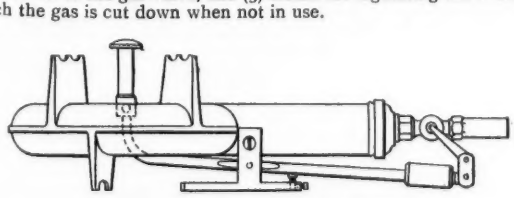
The claims made for the invention are (1) for the means employed for starting and stopping the heating appliance, consisting of two spring-controlled tappets actuating the cocks of the heating appliance, and held in normal position, one "on" and one "off," by pivoted levers operated to release the tappets by energizing electric coils which respectively attract the extremities of the levers, substantially as herein described. (2) The means for stopping the heating appliance, consisting of a pivoted counterbalanced or spring-controlled platform adapted to be depressed on the addition of a predetermined load to the platform, thus making electric contact and closing a circuit which energizes a coil operating to release one of the spring-controlled tappets, and cutting off the heat supply. (3) Automatically starting a burner, boiling water, pouring a certain amount of the water into an adjacent receptacle, stopping the burner, and ringing an alarm bell.

Controlling the Supply of Gas to Stoves.

BANKS, E. W., of Stratford, Essex.

No. 3745; Feb. 13, 1913.

This automatic means for operating the taps of gas-rings, &c., is of the type in which the action of placing the pan or the like over the burner, or removing same therefrom, operates a lever to actuate the gas-valve for turning the gas up and down respectively through mechanism comprising (1) an operating lever having a tappet at one end and a weight at the other, (2) a connection from the weighted end of the lever to the gas-valve, and (3) means for regulating the extent to which the gas is cut down when not in use.



Banks' Supply Control for Gas-Stoves.

As shown, the tappet carried by the operating lever is capable of vertical adjustment by a stop on the gas stove limiting, to a predetermined extent, the movement of the operating lever for the purpose of regulating the supply of gas. The arrangement is such that the placing of the pan over the burner, in depressing the tappet, raises the remote end of the lever to open fully the gas-valve, while the reverse action takes place when the pot is removed—the weight causing the lever to fall as far as the adjustable stop will allow and so setting the valve as to cut down the light to consume a minimum quantity of gas.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill brought from the Commons, read the first time, deemed to have been read a second time and reported: Lancashire (Middle Ward District) Water Order Confirmation Bill.

Bills read the third time and passed: Barry Urban District Council Bill, Silloth Gas Bill.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills read the third time and passed: Bradford Corporation Bill, Gas and Water Orders Confirmation Bill (No. 1), Ebbw Vale Water Bill, Leicester Corporation Bill, Metropolitan Water Board Bill, Rochford Rural District Council Bill.

The Kirkcaldy and Dysart Water Order Confirmation Bill has been read the third time and passed.

KINGSTOWN ELECTRIC LIGHTING ORDER.

It was mentioned in the "JOURNAL" last week that trouble had arisen over the removal of the Kingstown Electric Lighting Order from the Provisional Orders Bill (No. 6), which contained also an Order relating to Portrush. It will doubtless be remembered that the withdrawal of the Order was attributed by Mr. Tim Healy to some arbitrary action by the Board of Trade; and he demanded an explanation—threatening to block all the Private Bills for the rest of the session if it was not given. The matter came before the House of Commons last Tuesday, on the motion for the consideration of the Bill.

Mr. WHITLEY (the Chairman of Ways and Means) said the Bill had come down to them from the House of Lords containing two Provisional Orders—one opposed and the other unopposed. The time of the session was very late; and it seemed to him doubtful if the Bill could get through its further stages unless the opposition were withdrawn. That being so, he invited all those whom he knew to be interested in the Bill to meet him in conference, to see if the opposition could be removed. He was unsuccessful in this effort, and he found that the Bill would be opposed on the second reading, and that there was already a petition against one of the Orders, which necessitated its going before the Opposed Bills Committee. The Chairman of the Committee informed him that it was out of the question to set up a Committee at that period of the session. It, therefore, seemed to be a choice between losing both Orders or taking only one of them. These facts had been brought before the Board of Trade, whose representative attended the conference, as well as the Parliamentary Agents of the parties promoting the Orders; and the conclusion was come to that it would be better to save one Order instead of losing both. This was the simple explanation of the position. He had been doing his best to bring together the parties concerned. What he proposed to do now, with the co-operation of the Board of Trade (whose consent he had received to the suggestion), was to propose that the debate that night should be adjourned; and, in conjunction with the Board of Trade, he would put down on the paper the necessary motion empowering the Opposed Bills Committee to divide the Bill into two parts—the opposed and the unopposed—and later he would ask the House to sanction the carrying-over of the opposed Order, so that the expenditure of the promoters might not be lost. If this were not accepted, the Bill could have no possible chance of getting through during the present session. He therefore invited Mr. Healy to move the adjournment of the debate, and he (Mr. Whitley) would put the motion down at the earliest possible moment.

Mr. HEALY said he desired to express his indebtedness to the Speaker and the Chairman of Committees for the course adopted in this matter. At first he was filled with suspicion as to the action that was being taken; and if he had done any injustice to the Chairman of Committees he wished to express his regret. The reason he felt so strongly about the matter was this: The Order was promoted by a very well-known gentleman in Ireland—Mr. W. M. Murphy—at the instance of the Kingstown Urban District Council. He undertook to lay out upon it a sum of £40,000, and he did so, after the Kingstown Town Commissioners had exhausted every effort, having allowed their own Order to lapse for ten years, to provide the township with a supply of electricity. He thought any man in a country like Ireland who came forward to spend a large sum of money in this way deserved some encouragement. In addition to this, in opposing the Dublin Gas Company in the House of Lords, Mr. Murphy spent £2000; and it seemed to him (Mr. Healy) a strong order that when the Bill reached the Commons, after passing the House of Lords, it should be suddenly throttled by procedure with which he was not acquainted. As the right hon. gentleman (Mr. Whitley) was willing that the matter should now pass without further explanation of any kind, he entirely accepted the proposition. He trusted that next session the Order would be considered on its merits, and not by reference to any other proposals which the advantages of the delay might give to its opponents. He moved the adjournment of the debate.

The motion was agreed to.

Next day, the Bill, as amended, was re-committed to the former Committee for the purpose of reinstating the Kingstown Order; and, on the motion of the Chairman of Ways and Means, it was resolved that the Committee should have power to divide the Bill into two Bills—one for the opposed and the other for the unopposed Order—and that the former should stand referred to the Committee of Selection.

MISCELLANEOUS NEWS.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

The Annual General Meeting of the Company was held last Saturday week, at the Gas-Works, Willoughby Lane, Tottenham—Sir CORBET WOODALL, D.Sc., in the chair.

The SECRETARY (Mr. E. Topley) read the notice convening the meeting; and the report and accounts were taken as read.

THE LATE MR. JAMES CLOUDSLEY.

The CHAIRMAN said, before proceeding to the business part of their engagements for the meeting, he knew the proprietors would expect him to speak of the loss the Company had sustained, since they last met, by the death of their friend Mr. Cloudsley. Mr. Cloudsley lived in the neighbourhood, and was known to a great many people; and the number of his friends was the number of those who knew him. He was in every sense a most amiable man; and at the same time he was one of the most devoted of Directors. His attendance at their Board meetings was very regular. This, however, was no measure of the value of his work. Whenever he was required, he was always there. The Directors deeply regretted the loss of him from the Board. He (Sir Corbet) thought it would be becoming, seeing how long had been Mr. Cloudsley's connection with the Company, if the proprietors passed a resolution expressing their appreciation of the work he had done for it, and their sympathy with the widow he had left behind. He moved a resolution accordingly.

Mr. OSBORN, in seconding, said he had known Mr. Cloudsley, and had worked with him in local affairs; and he could endorse all the words respecting him that had been uttered by the Chairman.

ECONOMIES FROM CAPITAL EXPENDITURE.

The CHAIRMAN then moved the adoption of the report and accounts. Dealing first with the capital account, he said that, though the expenditure in the half year had been high, yet it had not been equal to the increase in the growth of the Company's business. The proportion of the capital to gas sold had again been reduced, and now stood at under £380 per million cubic feet. This was commendably low; and the charge for interest and dividend was still just about 5½d. per 1000 cubic feet sold. The capital expenditure had been largely for the purchase of additional land. First of all, they had to buy a site for the generating station for the electricity supply work the Company were going to take up in Wood Green. Then they had bought a strip of land alongside the Tottenham works, some 3 acres in extent, which would be of great value to the Company in the extensions in contemplation. In addition, they had bought land for new show-rooms in Edmonton, West Green, and Enfield. The policy of establishing these branch offices, where consumers could conveniently call and pay accounts and leave messages, as well as show-rooms at which the Company's extensive stocks of appliances and fittings of all kinds could be seen and purchased or hired, had been amply justified by results. They also enabled them to decentralize the work of fitters and service layers. Many parts of the district were fully four miles from the central office in the High Road; and by the time the men had taken their truck the four miles out—and it was a fairly heavy truck—and brought it back again, they had done a large proportion of a day's work without practically anything to show for it. Now that the Company had these branch offices, this unprofitable part of the work would be reduced very materially.

COAL AND OIL, AND OTHER CHARGES.

Turning to revenue account, the first item was the most striking—that was, the increase of £12,250 in the cost of coal. Of this, £7535 was due to the extra quantity of 8933 tons carbonized, and the remaining £4715 to the increased cost per ton, which was equal to 1·17d. per 1000 cubic feet sold. The two following items, oil and coke for carburetted water gas making, showed a total decrease of £565. This was because during the half year the Company had made a smaller proportion of carburetted water gas than in the corresponding half of last year—in other words, they had reduced it from 32¾ per cent. last year to 26¾ per cent. this year. This had been the common practice this year, and generally to a larger extent, by gas companies, and was due to the present very heavy price of gas oil. The reason for the high price of oil was not easy to find. Shortage of tank steamers was put forward as a reason; but as new ones were constantly being built, this seemed scarcely sufficient. The oil supplies were far from giving out; and the chief reason seemed to be that the producers had followed the lead of the coal owners, and, in this time of booming trade, had gone in for higher profits. Unfortunately, there was little prospect of an immediate fall in the price; and the tendency would be to revert still more to coal gas. The disadvantage of this was that a greater production of residuals would ensue, which might have an unfavourable effect on the residuals market. The price of oil had to be balanced against the revenue for residuals, and the economical proportion of oil gas be adjusted to the altering conditions. Manufacturing and distribution items were about proportionate to the increased sale of gas, with the exception of repairs to works, which showed an increase of £4526. It was always found, when large extensions were in progress, that there were many incidental expenses which one was loth to charge to capital, they being renewals—hardly extensions. The reduction in the cost of public lighting was mainly due to the fact that a considerable charge on this item for the cost of automatic lighting appliances, which had been extended over a series of half years, had been practically finished; and therefore the last half year showed less. The rates for the second time showed a large increase, in consequence of the new assessments; but the assessments now made would not be varied appreciably for some four years to come.

NATIONAL INSURANCE.

The National Insurance Act contributions and the Employees' Provident Society together formed a considerable charge on the half-year's accounts. The latter would be less in future. With regard to the National Insurance Act, out of the 600 members of the Company's Approved Society, 188 had during the twelve months ended July 15 claimed sickness benefit, amounting to £626, and maternity benefit had been granted to 58 members. "May the number increase." It had been stated by many friendly societies that sickness claims had been far greater since the Act came into force than formerly; but this had not been the experience of the Company. Under the old Society, with a membership of 164, the claims for the twelve months ended June 30, 1912, were 67, or 41 per cent.; while for the year ended July 15, 1913, under the Act, the claims had been 188 on a membership of 600, or 31·3 per cent. The working of the Act by the Society had proceeded with great smoothness, and its benefits were being rapidly understood and appreciated by the insured.

A BIG INCREASE IN CONSUMPTION, AND OTHER FAVOURABLE ITEMS.

Turning to the credit side of revenue account, the 8·29 per cent. increase in the gas sold had sufficed to make up the deficiency caused by a reduction in price, and to show a surplus of £3477. The rental of meters and appliances in consumers' houses presented, as usual, a very satisfactory increase. Residuals, on the whole, were better than last year. Coke showed 1s. per ton better. The price of tar was down a little. Sulphate of ammonia yielded less per ton by 12s. 10d.; but a saving of 8s. 6d. per ton had been effected in the manufacture, and a much larger quantity had been made. Cyanogen (which was a new manufacture for them) gave a good yield under the new process of recovery, which had been in use not quite four months, and had yielded £165. It had chiefly been due to a larger revenue from residuals that they had up to now looked to enable them to bear the increased cost of coal. Just now, however, while they were paying higher prices for coal, residuals showed little disposition to respond.

WORKING RESULTS.

As to working results, the quantity of coal gas made per ton had been 12,901 cubic feet, against 12,785 cubic feet the previous year. The oil used per 1000 cubic feet of carburetted water gas was 2·18 gallons, as compared with 2·35 gallons. There had been an increased make of coal gas of 121,204,000 cubic feet, and a reduced quantity of carburetted water gas of 25,403,000 cubic feet; so that the net increase was nearly 100 million cubic feet. The increased sale of gas had been 74,335,000 cubic feet.

UNACCOUNTED-FOR GAS AND PREPAYMENT CONSUMERS.

The gas unaccounted for was up as compared with last year. It was 4·65 per cent., as against 3·18 per cent. It was always difficult to explain why this item should vary. Every care was taken to make the registration of meters coincide as nearly as possible as to date. It was probably due to the increased number of prepayment consumers, the meter of every one of whom had a certain amount of money remaining in it at the end of each quarter. This year they had 45,014 meters, all containing money, as against 42,522 last year—an increase of 2492. Year by year, the average consumption also increased; the amount for the past half year averaging 8497 cubic feet, as against 8104 cubic feet—an increase of 393 cubic feet. Among the 45,014 consumers by coin meter, there were 19,985 cookers in use. The proportion was always increasing, and would in all probability be doubled within the next few years.

AUTOMATIC PUBLIC LAMP CONTROL, AND RECORD CONSUMPTIONS.

The half year had been unique in producing the record day's output from the works, which usually came during the Christmas half. During the morning of Saturday, Feb. 15, a remarkable darkness spread itself over North London, with the result that the gas was lighted as at night. The day's output was 8,767,000 cubic feet. During the phenomenal darkness, the Company were able, by means of the automatic control of the street lamps from the works, to light the whole of the public lamps, for which they subsequently received the thanks of all the local authorities in their area. Yet another item of interest was that the lightest output for one day during the half year bore a greater proportion to the heaviest than had been previously recorded. On Whit Monday, May 12, their smallest demand was experienced—namely, 3,592,000 cubic feet, which was two-fifths of the largest day. Many of them remembered when the proportion was one-fifth.

CAPITAL ISSUE.

The issue of £60,000 "B" stock in March was well taken up; applications being received for £24,345 in excess of the amount offered. The average price realized was £116 10s. 9d., showing, on the last dividend of 5¾ per cent., an interest of slightly under 5 per cent. per annum to the investor. The result of this rather considerable issue was seen in the fact that the loan from the Company's bankers, which frequently had been a feature of the balance-sheet, was replaced by a cash deposit with them of £40,000. In view of the large construction of works about to be undertaken, it was probable that this would have disappeared before the close of the year.

THE BILL—REDUCTION OF PRICE TO 2S.

The Company's Bill in Parliament now only awaited the Royal Assent. All the District Councils in the Company's area, except Tottenham, welcomed the Bill; and the Company were able in the end to convince Tottenham that it was not inimical to the interests of their ratepayers, and their opposition was withdrawn. About the most pleasant circumstance with regard to the passing of the Bill was the revelation it made to the Directors as to the position in which they stood *vis-a-vis* the local authorities. Tottenham did not take their opposition to Parliament. The result was that they carried their Bill through without opposition from any local authority. Their friends the electricians fought the matter to the finish, and carried a forlorn hope even into the House of Lords, but without winning a single point at any stage of the contest. That the amalgamation would benefit consumers in Enfield there could be no doubt, as it would bring about a rapid reduction to them in the charge per 1000 cubic feet of gas. In order to convince the Tottenham Urban District Council that the consumers in their area would not suffer, the Directors had anticipated the pledge which would in any case have been given

that day, and promised a reduction from Christmas next to 2s. per 1000 cubic feet. Under the Bill, Enfield consumers paid 8d. extra for three years; 5d. extra for the following two years; and 2d. extra for the two years next ensuing—thus reaching equality in price with Tottenham in seven years. By this arrangement, they would next year pay 2s. 8d. per 1000 cubic feet, as against 3s. 1d. at present paid by those who did not use gas-cookers and 2s. 10d. by those who did. The average price for the whole district would thus be about 2s. 1d. The economies to be effected by amalgamation could not be expected to commence instantly, but would be brought about in the near future; and with the great increase of business which might reliably be expected in Enfield from the reductions of price would soon have a beneficial effect. On the other hand, the heavier capital expenditure natural to their smaller undertaking supplying gas over a very large area, together with the extensions necessary to deal with the increasing business, would temporarily put up the capital per million.

THE ELECTRICITY SUPPLY SCHEME.

With regard to the electric scheme, the capital and revenue accounts were to be kept separate from gas; but the capital was common to both. The work would be pushed on with all speed, and Wood Green would at last have an electric supply—it was hoped and believed—second to none in North London, both in regard to efficiency and price. The Directors had undertaken not to exceed 5d. per unit for lighting, 2d. for power, and 2½d. for public lighting. The average of these prices would set a standard for cheapness which would be to the credit, as it would be, the Directors were assured, to the profit, of the Company.

CO-PARTNERSHIP.

Co-partnership continued to prosper exceedingly. It would be observed that the bonus for the half year amounted to £2306, or £4306 for the year to June 30, against £3651 for the preceding twelve months—an increase of 17·9 per cent. This increase was due partly to a greater number of employees, but chiefly to the reduction in the price of gas, which brought the bonus up to the very satisfactory figure of 8¼ per cent. on all salaries and wages for the six months ended June 30. The system gave continual satisfaction to all concerned. The Directors had seen in particular, with especial pleasure, that the spirit of thrift, which it was the work of co-partnership to foster, had more and more gained ground among the men, as evidenced by the fact that the half bonus which it was in their power to withdraw had, during the last two years, been increasingly left by them with the Company. On June 30 last, the stock held by co-partners, and acquired by them through the co-partnership bonus, was £9365, of the value of £10,863. The cash belonging to co-partners in the hands of the Company and the trustees was £8882. The total value of stock and cash was £19,745, or an average of £31 per co-partner, which must be considered an eminently satisfactory result of five years' working of the system.

FACING THE FUTURE WITH EASY MIND.

He thought he had sufficiently explained why the increase in the balance carried forward was less than had been usual in recent years. One thing was quite sure—they could face the coming year, with its lower charge for gas and higher price of coal, with easy minds as to the receipt of the better dividends to which the proprietors would be entitled.

Mr. JAMES RANDALL, in seconding the motion, said it was quite unnecessary for him to add anything to the Chairman's lucid and exhaustive explanation of the position of their affairs. They had all listened to him with pleasure, knowing the intense interest he took in the Company and all the workers.

Mr. D. MOORE expressed his satisfaction with the position of the Company's affairs. He was particularly pleased to hear Sir Corbet's remarks regarding co-partnership. Five years ago he (Mr. Moore) said he believed it was a splendid thing for their workers to have a share in such a progressive concern, and to be able to co-operate in making it prosperous. As one who was born the same year as the late Mr. Cloudsley, and as one who had known him so long, he should like to bear testimony to his splendid character as a man, and as a business man. He was an example to the young men of the present day; he (Mr. Moore) was speaking as one who had now reached the age of 76 years.

Mr. WALLER also expressed his appreciation of the co-partnership scheme, and suggested that the men should be allowed to sign-on for six months.

Mr. WINDSOR said he should like, if in order, to propose a resolution adopting a 30s. minimum wage for all the workers over 21 years of age. There were some married men working for the Company who were only receiving between 22s. and 25s. a week.

The CHAIRMAN thought that such a proposition as the last one might very well be brought before the Co-Partnership Committee, and any representation from them would, of course, receive the careful attention of the Directors. It was not a matter that could possibly be taken up at a shareholders' meeting, where the information available would not be such as would enable the proprietors to come to any proper determination. As to Mr. Moore's remarks, they all highly appreciated his testimony to their late friend; and, on behalf of the Directors, he thanked him for his reference to the management of the undertaking. As to Mr. Waller's remarks, a considerable number of the co-partnership agreements would be extended in the coming week. Their agreements were usually for twelve months; and he did not think they had any agreements for less than six months. That being so, Mr. Waller's wish was already realized in the practice of the Company.

The resolution was unanimously carried.

Mr. HENRY BAILEY proposed the declaration of the full statutory dividends of 7⅞ per cent. per annum on the "A" stock, and 5⅞ per cent. per annum on the "B" stock, both less income-tax. He remarked that it was with much pleasure that he had to propose the payment of the increased dividends warranted by the reduction in the price of gas last January. The accounts were not so favourable as the Directors could have wished, but they showed a balance sufficient for the dividends with a slight increase in the amount carried forward. This they could not but regard as satisfactory, especially when they considered the greatly increased cost of coal, which unfortunately still continued. They hoped the coming winter would continue to show an improved result in the value of coke (which had not kept pace with that of coal), and that they might go on presenting accounts as favourable as in the past.

Mr. HENRY WOODALL seconded the motion.

The CHAIRMAN observed that Mr. Bailey had said the accounts were not so favourable as the Directors could have hoped for; he might have said that they were as favourable as was expected.

Proposed by the CHAIRMAN and seconded by Mr. JAMES L. CHAPMAN, Mr. Henry Bailey was re-elected to his seat at the Board.

Mr. BAILEY, having responded, moved the re-election of Mr. Henry Woodall, and spoke of his engineering experience being of great advantage to the Board.

Mr. E. CROWNE seconded the motion, and it was unanimously carried.

Mr. WOODALL having acknowledged the confidence of the proprietors,

On the motion of Dr. SCOTT, seconded by Mr. OSBORN, Mr. Edward Crowne was re-elected one of the Auditors.

Mr. CROWNE, in his reply, alluded to the careful way in which the books and accounts were kept by Mr. Topley and his staff.

Mr. H. D. ELLIS moved a vote of thanks to the Chairman and Directors, and to the Auditors, officers, staff, and workmen. He remarked that he always felt conscious of failure in attempting to propose this resolution; for he felt that any attempt at the laudation of the Board and officers was as hard a task as a man could have imposed upon him. He felt that any words of comment must be weak and feeble compared with the eloquence of the facts and figures before the proprietors, which were proof of what the Directors, Mr. Broadberry, Mr. Topley, and the men had done for them.

Mr. R. S. KEYS seconded the motion. He expressed the hope that the absence of the Deputy-Chairman (Sir Daniel F. Goddard) was not through indisposition.

The CHAIRMAN, in the course of his acknowledgment on behalf of the Board, said he regretted to say that Sir Daniel Goddard was ordered to leave his parliamentary duties, and go abroad for a cure, because his health was not what could be wished; but he (Sir Corbet) hoped to see him back with renewed health. Referring to the officers and workmen, he added that happier relations could not exist between them and the Directors than was the case now.

Mr. BROADBERRY and Mr. TOPLEY also made acknowledgment of the vote; and this concluded the proceedings.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly General Meeting of the proprietors was held last Friday, at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and statement of accounts were taken as read.

HIGHER WORKING COSTS—GOOD INCREASE IN SALES.

The CHAIRMAN, in moving the adoption of the report and accounts, said: We are glad to be able to present so favourable a statement, notwithstanding the adverse conditions which were created by the abnormal advance in the price of coal last year, and also by the higher prices of nearly all the materials required for gas-making purposes. For the half year under review, the coal bill alone shows an increase, as compared with the corresponding period of last year, of nearly £17,000, or, deducting extra receipts for residuals, about £12,000. Fortunately the increase of 4·35 per cent. in the gas sales more than sufficed to compensate for the reductions of price made last year—to the extent of about £900 in fact. But, allowing for this, there is the formidable addition to working cost, of £11,000, to be made up from other sources. That it has not been fully made up is hardly surprising; but it has been sufficiently so to admit of the payment of the full statutory dividends at the same rate as last half year, and carrying forward to next half year the additional sum of £1738. Such a result is particularly gratifying when it is recollected that the price of gas in the old South Suburban area is now lower than at any former period in the history of the Company, and 4d. per 1000 cubic feet less than the highest price reached during the ten years prior to June, 1912; while the average cost of coal was 1s. 5d. per ton more than the very highest average price paid in any half year during the same period.

MANUFACTURING CONCENTRATION AND A HIGH YIELD OF GAS.

The strong position which these figures indicate is due in part at any rate to the economies which the amalgamations of last year rendered possible; one of the most important of these being the transference of the manufacture hitherto carried on at Bromley and Erith to Lower Sydenham, where a high degree of efficiency in carbonizing methods has been attained, as evidenced by the yield of gas per ton at this works having reached the high average of 13,060 cubic feet. This transference has resulted in an appreciable, and—it needs hardly be said—most welcome reduction of working costs. I stated last February that the whole of the works and distributing centres had been linked-up by connecting mains; and these mains are now in use, gas being regularly transmitted through them from Lower Sydenham to the various stations *en route* as far as Erith—a distance of about 14 miles—the system being so arranged that, at will, the operation can be reversed, and gas sent instead from Erith to Lower Sydenham and the stations between.

COAL AND RESIDUALS.

We are not yet, however, "out of the wood" as regards coal, which, for the next twelve months at any rate, whatever may happen afterwards, will be costing more than it did during the year just ended, while, so far as can be foreseen, the receipts for residuals will be less, The prices of coke and sulphate of ammonia have already fallen appre-

ciably, although for tar the recent comparatively high level of prices continues to be maintained.

PLANS FOR THE FUTURE.

The manufacturing plant at Erith being small and out-of-date, has had to be dismantled; and it has been decided not to continue the reconstruction which had been contemplated by the late West Kent Gas Company. After very careful consideration of all the surrounding circumstances, other plans have been formed, which, in the opinion of the Directors, promise greater advantage to the undertaking. These plans will be laid before you in due course; and we hope to have your approval of them. The manufacturing plant at Bromley is being maintained in a state of thorough efficiency for winter use if required. The delivery of coal to this works costs more than that to Lower Sydenham; and it is desirable, as a matter of course, to avoid this extra expense as much as possible. Both stations, Bromley and Erith, will for the present continue to be used as distributing centres.

THE CALORIFIC STANDARD.

It will be recollected that in our Act of last year a calorific standard is substituted for the illuminating power standard prescribed by our Act of 1906. This change (which applies to by far the largest part of our area) was made at the instance of the London County Council as being in conformity with the altered conditions of gas supply—heating value having almost completely taken the place of illuminating power as the standard of value to the consumer. Public opinion, as well as expert opinion, is, so far as can be gathered, quite on the side of this change to a calorific standard, which in several cases this session has been approved by Parliament, so that its general adoption can only be a matter of time. If I might venture to make a suggestion thereupon, it would be that a combined endeavour should be made by the gas industry before it is too late to secure something like uniformity of legislative provisions, both in form and substance, so as to avoid if possible the confusion which to this day exists as to illuminating power, owing to a multiplicity of standards. That the time is already ripe for some such effort seems to be abundantly clear.

BENZOL FROM GAS.

A great deal has recently been said as to the possibility of utilizing the benzol which is a constituent of the gas as now supplied to the public, for making up the shortage in the supply of spirit suitable for motor purposes. It is, however, upon benzol that gas is largely dependent for its passing the illuminating power test; so that, until this is abolished at all events, it is certain that this source of supply cannot be available to any extent, whatever may prove to be the economical advantages of the proposition.

NEW CONSUMERS AND DEVELOPING HEATING BUSINESS.

It will be seen, by reference to the capital account, that considerable sums have been expended during the half year on mains, meters, and stoves, from which, and the figures given in the report, it may be inferred that development of the new areas is actively proceeding. During the half year, more than 1700 consumers were added in the West Kent area alone—a number which is likely to be much exceeded this half year; while it is satisfactory also to know that the various industries in this area are in a prosperous condition, and that, so far as can be judged, additional consumption from this source may be looked for. The greater proportion of the new installations referred to in the report are cookers, both prepayment and ordinary, but there are also included a large number of gas-fires; advantage having been taken by consumers of special terms offered to them for all orders placed by them during the summer months, the object of which is to prevent as far as possible any congestion of orders in the autumn and winter. This serves the double purpose of ensuring more regular employment of the fitters, and avoiding complaints of delay on the part of consumers. Hot water circulators and geysers have also been in good request; and consumers are being brought more and more to realize that the entire needs of a household, not only for light but also for heat, can be, and are, met by means of appliances easy to control, requiring little or no attention, and securing a maximum of cleanliness and convenience. There is, I am glad to say, every indication of a continuance of considerable activity in this direction.

ACCIDENT FUND AND ACCIDENT INJURIES.

As stated in the report, the workmen's accident fund has again been certified as a contracting-out scheme by the Registrar of Friendly Societies, for a further period of five years, after revision of the rules by the Co-Partnership Committee, mainly to suit the altered conditions consequent upon the enlargement of the undertaking. This fund was established by the late Sir George Livesey in furtherance of his endeavour—which finds such admirable expression in his co-partnership scheme—to enlist all employees on the side of efficiency and economy. The motto of this fund is "Prevention is Better than Cure;" its object being the prevention of accidents. While, therefore, securing to sufferers from accidents greater benefits than they would receive under the Workmen's Compensation Act, 1906, these greater benefits are in part provided by contributions from the employees themselves, the amount of which is made dependent upon the number of accidents that occur, so that every employee has a direct interest in its reduction. In recognition also of the fact that accidents are largely due to want of thoughtfulness and care, the rules of the fund provide for an inquiry into every accident by a jury of twelve workmen selected from such as have been in the Company's service three years and upwards. Over this jury the Engineer of the Company presides, except in fatal cases, when his place is taken by the Chairman or some other Director. It has been my lot as Chairman to preside over two such inquiries; and I am therefore able to testify from personal experience to the great care with which they are conducted. The light which is thus thrown upon the causes of accidents undoubtedly assists in the prevention of them, and in the endeavour to realize that which was so greatly desired by Sir George—namely, that none of the accidents at the South Suburban works should be due to preventable causes.

CO-PARTNERSHIP.

The large addition to the number of co-partners, consequent upon the amalgamation, coincides with the payment of the largest bonus ever declared by the Company; being at the rate of 7½ per cent. on the total wages or salary earned, and amounts to £5607. The rate of bonus being dependent upon the price of gas, establishes identity of interest between consumers and employees, while the bonus being for the most part invested in the Company's stock, the employees become doubly interested in the prosperity of the undertaking. The total amount of the bonuses paid since 1894, the year when profit-sharing, as it was then called, was adopted by this Company, is £50,090, of which £36,697 remains to-day invested in the Company's stock—there being also £10,442 placed on deposit with the Company. In addition to this ex-co-partners, now retired from the Company's service on their superannuation, hold between them stock to the value of £3959. It is, of course, essential to the scheme that as much as possible of the bonus be invested, not only that each employee shall have a stake in the undertaking, but to encourage the exercise among them of thrift, and a habit of putting by for a rainy day or for acquiring a position of comparative independence. It is therefore very gratifying that so large a proportion is so invested, and encourages the Directors to look forward to the continued success of the scheme, their belief in which is further confirmed by the expressions of appreciation of it which have reached them from newly admitted co-partners, and by the proofs of zeal which these have already furnished.

Mr. JOHN BORASTON, in seconding the motion, said the duty was merely a formal one, because the Chairman had explained the report in his usual clear and exhaustive manner. There were, however, two subjects which he thought he might perhaps emphasize. One the Chairman had referred to—that was the very high standard of carbonization which had been obtained at the works. He believed that their make was somewhere near the top notch—at all events, he did not think that many companies succeeded in maintaining an average of 13,060 cubic feet per ton of coal carbonized. This was extraordinary testimony to the skill and attention of the engineering staff, just as, in another field of work, the great increase in the sale of gas-fires, heaters, and other appliances was testimony to the ability and capacity of the business staff. The other point he desired to mention was that they had every reason to congratulate themselves on the point that, in spite of the very material increase in the price of coal, in spite of the slackening off of the market for residuals, the Directors were able to present to the proprietors that day so satisfactory a report. There was also foundation for excellent hope for the future. It had been already noticed that, during the last six months, the system of mains had been greatly increased, notably in the area of the old West Kent Gas Company. This was expenditure that always produced excellent results, and would continue to do so in an increasing degree for many years to come.

The motion was unanimously carried.

The CHAIRMAN, in the absence of the Deputy-Chairman (Mr. Jabez Light), moved the declaration of dividends, less income-tax, at the rates per annum of 5 per cent. on the preference shares, 6 per cent. on the ordinary stock, and 5⅛ per cent. on the West Kent stock.

Mr. W. G. Waller, in seconding, took the opportunity to express, on behalf of the employees, their gratitude for the handsome bonus received during the half year. He was sure that every co-partner would do his very best to win further success for the Company; and they would not be satisfied until they had reached the very top rung of efficiency.

The motion was unanimously carried.

Mr. HAROLD GUNDRY proposed a vote of thanks to the Chairman and Directors for their services during the half year.

Mr. BERTRAM LATTER seconded the motion; and it was heartily agreed to.

The CHAIRMAN, in reply, remarked that both his colleagues and himself were much obliged to the proprietors for their kind vote of thanks. It was a great encouragement to feel that they possessed the confidence of the proprietors. He was sorry that on this occasion two of the members of the Board were absent. To Mr. Light's absence he had already referred; and he was sorry to say that Sir Fortescue Flannery was also confined to his house owing to indisposition. There was one more pleasing duty which generally devolved upon the Chairman, and which he had much pleasure in performing—that was, to propose a vote of thanks to the chief officers, staff, and employees for their zeal and attention to the interests of the Company during the past half year. The Directors and proprietors were greatly indebted to them all from Mr. Shoubridge and Mr. Wastell downwards. In fact the whole of them worked extremely well during the half year.

Mr. G. READ CLARKE seconded the motion; and it was cordially carried.

Mr. S. Y. SHOUBRIDGE thanked the Chairman and Directors and proprietors very heartily indeed, on behalf of the engineering staff and the employees, for this kindly expression of confidence and approval of the work they had done during the half year. He could assure the proprietors that their recognition was stimulating and encouraging to them, and would help them to do in the future what they had tried to do in the past—their utmost on behalf of the Company.

Mr. WASTELL also responded for the clerical staff and himself. In the course of his remarks, he said that if he might strike one personal note, he should like at the end of his first year with the Company to express his heartfelt gratitude to the Directors for the kindly way in which they had borne with him while he had been serving what was practically an apprenticeship. He also desired to acknowledge the loyal way the staff had seconded his efforts. He could not speak too highly of the unity and unanimity with which the members, from the senior officials downwards, had seconded the efforts of the principal officers to further the Company's interests.

High-Pressure Gas in Billiard Halls.—The Gas Committee of the West Bromwich Corporation have secured a contract for the introduction of high-pressure gas into a large billiard hall which has been erected in the borough by Willie Holt (Burnley), Ltd., and which is to contain 23 tables. It is believed that this is the first billiard hall in the country in which high-pressure gas will be used; and the Corporation Gas Engineer (Mr. Harold E. Copp) is, of course, doing his utmost to make the experiment a success.

CROYDON GAS COMPANY.

Half-Yearly Report and Accounts.

In the report to be presented at the half-yearly meeting of the Croydon Gas Company on Friday, the Directors state that the sales of gas in the six months ended June 30 exceeded those of the corresponding period of 1912 by 5·07 per cent.; and the number of consumers ncreased by 1051. The number of stoves on hire augmented by 1806, while 342 stoves were sold to consumers; representing a total increase of 2148 stoves. The policy recently adopted, of letting on hire as well as selling geysers and hot-water circulators, is producing good results. In the past half year, 119 consumers availed themselves of the terms offered by the Company. The Directors express their regret at announcing the relinquishment by Mr. J. W. Helps of the office of Engineer and Manager of the Company, and they indicate the staff changes consequent thereon. These have already been notified in the "JOURNAL," and are referred to again in our "Personal" column to-day.

The accounts accompanying the report show that the total revenue was £142,112, of which £94,141 was derived from sales of gas, £11,505 from rental of meters, stoves, and house fittings, and £36,140 from sales of residuals. A sum of £71,391 was expended on manufacture, and £22,309 on distribution; rents, rates, and taxes came to £4940; management cost £5012; and the total expenses (inclusive of £1561 for the co-partnership scheme) were £111,011. The balance carried to the profit and loss account is £31,101; and the amount available for distribution is £49,327. The Board recommend the payment of dividends at the rates of 15, 12, 10, and 5 per cent. per annum, all less income-tax, on the various classes of stock. This will absorb £23,599, and leave a balance of £25,728.

The statements relating to the working show that 51,106 tons of coal and 392,428 gallons of oil were used during the half year to manufacture 805,147,000 cubic feet of gas, of which 758,459,600 feet were sold and 767,797,600 feet were accounted for. The estimated quantities of residuals produced were: Coke, 30,615 tons; breeze, 6353 tons; tar, 544,288 gallons; ammoniacal liquor, 1,583,426 gallons—the make of sulphate being 587 tons.

NEWPORT (MON.) GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Mr. T. G. CARTWRIGHT, J.P. (the Deputy-Chairman), presiding.

The SECRETARY (Mr. T. H. Hazell) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ended the 30th of June, was presented. The accounts showed a balance of £11,763 available for distribution; and the Directors recommended the payment of the statutory dividends.

The CHAIRMAN, in moving the adoption of the report and accounts, said the Company this year completed its seventieth year, having been incorporated on May 31, 1843; and though he supposed they must count themselves as growing old in point of time, he was pleased to be able to say that their vitality increased. During the half year the sales of gas had been very satisfactory considering the weather, showing, as they did, an increase of 3½ per cent. as compared with the corresponding period of last year. There had also been satisfactory increases in the sales of both coke and tar. The net result of the working was that they would be able to pay interest on the loan account, and also the usual dividend at the rate of 5 per cent. per annum, and carry forward £1063 more in the profit and loss account than at this time last year. This, of course, meant that they were strengthening their reserves. Turning to the fittings account, the Chairman said the total number of cookers now was 12,964; of gas-fires, 4264; and of gas-engines, 118. In conclusion, he paid a tribute to the valuable work done by the staff in all departments during the half year.

Mr. G. GEEN seconded the motion, and it was carried without discussion.

The dividend having been declared and the retiring Directors and Auditor re-elected, votes of thanks were accorded to the Directors and the staff, which were acknowledged by the Chairman, Secretary, Engineer (Mr. Thomas Canning, J.P.), and the Manager of the Crindau works (Mr. J. H. Canning).

CAMBRIDGE UNIVERSITY AND TOWN GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday—Mr. W. B. REDFERN (the Vice-Chairman) presiding.

The accounts for the six months to the 30th of June showed a sum of £24,431 available for distribution; and the Directors recommended the payment of dividends at the maximum rates, less income-tax. The total quantity of gas sold was 219,737,000 cubic feet, compared with 205,696,000 cubic feet in the corresponding half of 1912.

The CHAIRMAN, in moving the adoption of the report, said the expansion in the business in the half year had probably been greater than in any similar period in the Company's history. Owing to the higher price of coal, the bill was increased to the extent of £3800 per annum, or equal to more than 2d. per 1000 cubic feet in the price of gas. This year they had had to enter into contracts at another 1s. per ton advance; making an increase of 3s. in two years. If this had to be passed on to the consumers, it would mean more than 3d. per 1000 cubic feet on the price of gas. The prices realized for coke, tar, and ammoniacal liquor, however, had been exceptionally good. There had been a large increase in the quantity of gas sold, and the make had been higher than ever before. These factors had enabled the Directors to produce a satisfactory balance-sheet, and show practically the same financial position as last year without having to raise the price of gas. The sum of £469 was put down to co-partnership, and this added to £450 charged for the same purpose last half year made a total of £919 divided among the co-partners for the year. He was glad to say that this scheme was working satisfactorily. The employees would now hold stock of the Company of the face value of £2500. The majority of the co-partners appreciated what had been done for them; and no doubt, as time went on, every workman would take an ever-increasing interest in the welfare of the Company. The sale of gas had produced an increase of £1800; but practically the whole of this sum had been swallowed up in the coal bill. The make of gas per ton of coal carbonized had been exceptionally good—being no less than 12,109 cubic feet, with the result that, though they had produced 14 million cubic feet more gas, they had used less coal than in the corresponding period of last year by 280 tons. The unaccounted-for gas, too, showed a satisfactory decrease.

Mr. J. STANDLEY seconded the motion, and it was carried.

On the proposition of the Chairman, the Engineer and Manager (Mr. J. W. Auchterlonie), the Secretary (Mr. A. E. King), the Accountant, and the staff were thanked for their services; and a similar compliment was paid to the Chairman.

PORTSEA ISLAND GAS COMPANY.

The Half-Yearly General Meeting of this Company was held at the offices last Thursday—Mr. R. E. HELLYER (the Chairman) presiding.

The profit and loss account showed an available balance of £41,519, which enabled the Directors to recommend dividends for the half year ended June 30 at the following rates per annum: 13 per cent. on the "A" and "B" shares, 12 per cent. on the "C" shares, 10 per cent. on the "D" and "E" shares, and 5 per cent. on the stock, all less income-tax—leaving a balance of £23,586 to be carried forward.

The CHAIRMAN, in submitting the accounts, stated that the only unsatisfactory feature of the half-year's working was the large increase in the cost of raw material and commodities and appliances generally. He pointed out that, though the expenditure on coal showed an advance of £761 compared with the corresponding period of 1912, this did not properly indicate the increased prices, as last year, owing to the strike, it was necessary to obtain supplies at prices very much in excess of the contracts then running. He, however, regarded the present prices as being abnormal; and because they were abnormal, he hoped and believed that, when the time arrived to again consider contracts, it would be found that the price would be more favourable to the Company. The quantity of gas sold was greater by 46 million cubic feet, and made a total of 682 millions. The gross revenue showed an increase of £6521, bringing it up to £125,120; the expenditure, exclusive of extraordinary renewals, an increase of £5096, making £104,887. The Chairman referred to the concession of 5 per cent. rebate granted to all prepayment consumers from the 1st of January last, and stated that, in fulfilment of a provisional promise made by him to the Chairman of the Finance Committee of the Corporation in December last, a further 5 per cent. rebate—making a total of 10 per cent. equal to 4d. per 1000 cubic feet—had been granted to this class of consumer from the 1st of July. As evidencing the necessity for rebuilding the present offices and show-rooms, which the Board have under consideration, the Chairman gave the following figures illustrating the growth of the Company's business since the present offices were built in 1876: The capital then employed was £177,867; in December, 1912, it was £471,894—an increase of £294,027, or 165 per cent. The annual make of gas was 275 million cubic feet; at the end of last year it was 1422 millions—an increase of 1147 millions, or 417 per cent. The gross revenue was £66,534; in December, 1912, it was £247,799—an increase of 181,265, or 272 per cent. The number of consumers was 6613; in December last it was 47,000—an increase of 40,387, or 610 per cent.

The report and accounts were adopted, and the dividends recommended declared.

The meeting terminated with a vote of thanks to the Chairman and Directors, the Engineer and General Manager (Mr. J. D. Ashworth), the Secretary (Mr. H. A. Stibbs), and the staff generally, for their efficient management of the Company's business.

ALDERSHOT GAS, WATER, AND LIGHTING COMPANY.

The Half-Yearly Meeting of the Company was held last Friday week—Mr. W. T. ROBERTSON, J.P. (the Chairman), presiding. The report was noticed in the "JOURNAL" for the 29th ult. (p. 329).

The CHAIRMAN, in moving its adoption, said the balance-sheet was an excellent one. They had had good coal and oil contracts; and the returns from residuals had been extremely satisfactory. Really their coal had only cost them, for the purpose of gas making, after deducting the receipts for residuals, something under £100 more than it did in the corresponding half of last year. Then the additional gas sold had entirely made up in the revenue the sum lost by a reduction of 2d. per 1000 cubic feet in the price of gas throughout the district. The increase in the sale of gas amounted to 6 per cent., which was very gratifying. The Company had instituted a complete co-partnership scheme with the men in their employ; and he was perfectly certain the results they were reviewing that day were in some measure the consequences of the introduction of this system. He wanted the consumers of gas and the town of Aldershot to know, as the result of the past half-year's working, the reduction in the price of gas had given gratuitously to the consumers in their districts the sum of £900, it would give the co-partners £90 a year extra, and it had given the "A" and "B" shareholders the magnificent sum of £45 for the half year. The Board saw no reason why the present good condition of things might not be repeated over and over again in the half years to come. They had an excellent staff, and with their General Manager and Secretary (Mr. R. W. Edwards) he looked forward to an extremely bright future. The Company had powers to supply the whole of the Farnborough, Camberley, Frimley, and Fleet districts with electricity. Contracts were being arranged for the erection of plant; and it was

hoped that within six months they would have cables laid over a certain portion of the area.

The report having been adopted, a vote of thanks was passed to the Chairman, Directors, and staff.

Mr. EDWARDS, in reply, referred in eulogistic terms to the staff, and said he regretted to lose the services of Mr. Urquhart, who was recently appointed Manager of the Dorking Gas Company.

SALFORD CORPORATION GAS SUPPLY.

Report of the Gas Committee.

In presenting to the Salford Town Council their report for the year ended March 31, a copy of which we have received from the Gas Engineer and Manager (Mr. W. W. Woodward), the Gas Committee expressed their pleasure in recording that there was a considerable increase in the number of consumers in the period named. The sales of gas also showed an increase equal to 3·69 per cent. The demand for gas appliances generally was satisfactory, and the business in cooking-stoves augmented considerably. The coal and cannel carbonized during the year amounted to 160,750 tons, and the quantity of gas made to 1,723,786,000 cubic feet, of an average illuminating power equal to 18·90 standard candles. From April 1, 1912, to Aug. 6, 1912, the parliamentary standard was 18 candles within the borough and 17 candles tested in the out-districts; and from Aug. 7, 1912, to March 31, 1913, the standard was 14 candles over the whole area of supply. The total receipts realized from the sale of residuals show a very considerable increase compared with last year.

On Aug. 7, 1912, the Local Government Board's Provisional Orders Confirmation (No. 10) Act, 1912, received the Royal Assent. This Act contains the Salford Order, 1912, which empowers the Corporation to acquire additional land for gas-works purposes, to borrow money for the gas undertaking, and to reduce the standard of illuminating power to 14 candles, as tested by the "Metropolitan" (No. 2) burner. The Order also abolishes the differential rates for gas in the out-districts, and restricts to £10,000 per annum the amount which may be handed over to the district fund in relief of rates.

From and after the reading of the meters for the quarter ended March 31 last, the differential rates in the out-districts were abolished; and in addition to this the price of gas was reduced to all ordinary consumers by 2d. per 1000 cubic feet—further reductions being made to very large consumers. After March 31 (from the date of the alteration of the meter in each case), the quantity of gas supplied for 1d. by prepayment meters was increased from 30 to 35 cubic feet. The charges for the hire of gas cooking-stoves were also reduced to nominal amounts; and a very large increase in business has resulted.

The accounts accompanying the report show that the revenue last year amounted to £260,890, of which £183,369 was for gas and the rental of stoves, and £76,943 for residual products. The expenditure on the manufacture of gas was £131,075; on distribution, £16,893; on management, £7728; and rents, rates, taxes, &c., came to £19,441—the total expenditure being £180,075. The balance carried to the profit and loss account was £80,815; and the total of this account was £84,348. From this was taken £21,146 for interest and annuities, £16,849 for redemption of loans, and £2526 for depreciation, leaving a net profit of £43,827 transferred to the district rate.

GLASGOW CORPORATION GAS SUPPLY.

The Accounts of the Department for the Year 1912-13.

We have received a copy of the forty-fourth report to the Corporation of Glasgow by the Committee on Gas Supply, with the accounts for the year from the 1st of June, 1912, to the 31st of May last; the former bearing the signature of the Convener (Mr. T. Paxton), and the latter that of the Treasurer (Mr. James Fleming). The particulars given in the report mark it as the most successful one ever issued by the Gas Department; and they furnish evidence that where a progressive and forward policy is adopted there is still plenty of scope for the gas industry. The following are the salient features of the report.

FINANCES.

Dealing first with finances, the Committee show the position by the following tabular statement:—

The gross revenue amounted to . . .		£1,022,917 11 10
and the gross expenditure to	£797,799 1 7	
To which is added depreciation written-off capital assets	70,779 18 3	
		868,578 19 10
The balance carried to profit and loss account being		£154,338 12 0
The Committee had to meet the following requirements during the year:—		
(1) Annuities on stocks	£21,278 19 5	
(2) Contribution to Glasgow Corporation loans fund, in respect of Glasgow Corporation 3 per cent. stock redeemable in 1921, issued in lieu of converted gas annuities	7,878 1 8	
(3) Interest on borrowed money, &c. . .	40,213 8 2	
(4) Sinking fund	59,804 6 2	
		129,174 15 5
Leaving a surplus on the year's operations of		£25,163 16 7
This has been disposed of as follows:—		
(1) To reserve fund account	£8,139 17 7	
(2) To surplus revenue account . . .	17,023 19 0	
		£25,163 16 7

The interest payable to the Corporation loans fund in respect of money borrowed was at the rate of £3 5s 9d. per cent., compared with £3 4s. per cent. for the preceding year.

The Committee applied £3329 18s. 8d. of the amount at the credit of the sinking fund to the extinction of £1205 of £9 per cent. and £300 of £6 15s. per cent. gas annuity stocks; and the annuities formerly payable upon these stocks now cease to be a charge upon the revenue of the department. There was also redeemed during the year, by the application of moneys at the credit of the same fund, a further amount of £35,000 of loans raised under the Glasgow Corporation Gas Act, 1869, the Glasgow Corporation (Sewage, &c.) Act, 1898, and the Glasgow Corporation (Tramways and General) Order Confirmation Act, 1901. The amount added to the sinking fund for the redemption of annuities, loans, and £3 per cent. stock was £66,181. The sinking fund, with its accumulations, now stands at £1,058,940, of which there has been applied in the redemption of borrowed money, £3 per cent. stock and annuities, £832,412; leaving still available for either of these purposes the sum of £226,528.

WORKING STATISTICS.

Turning to the working, the Committee state that the market for residuals was again favourable to the Corporation during the past year. The consequent increase of income from this source amounts to £25,174. The average price received per ton of coal carbonized was 5s. 5·878d., compared with 5s. 2·526d. for the previous year—an increase of 3·352d. per ton. The net sum realized from the sale of coke amounted to £140,320; being £27,610 more than that of the preceding year. The total quantity of coke sold was 307,178 tons, compared with 298,729 tons before—an increase of £8449 tons. The average price received was 10s. per ton, compared with 8s. 7d. for the previous year—an increase of 1s. 5d. per ton.

The quantity of coal carbonized in the year was 741,838 tons, compared with 687,542 tons in the year 1911-12—an increase of 54,296 tons. The average price paid for coals bought last year was 11s. 8d. per ton; being an increase of 2s. 2d. per ton compared with the preceding year. Contracts have been made for the supply of coals during the current year at an average advance of 1s. 6d. per ton.

The gas made per ton of coal carbonized was 10,424 cubic feet, compared with 10,483 cubic feet for the preceding year. The quantity of gas delivered and accounted for amounted to 7,070,833,972 cubic feet, compared with 6,557,184,884 for the preceding year—an increase of 513,649,088 cubic feet, equal to 7·83 per cent. The greatest quantity sent out during the year in 24 hours was 35,829,000 cubic feet. The maximum daily make was 32,528,000 cubic feet. The unaccounted-for gas was 8·56 per cent., compared with 9·02 per cent. for the preceding year—a decrease of 0·46 per cent.

DISTRIBUTION, ETC.

After giving a long tabular statement showing the sales of gas in the various districts of the city and suburbs, the Committee turn to matters connected with distribution.

Gas-Meters.—The number of ordinary meters in use on the 31st of May last was 210,105, compared with 217,523 for the preceding year—a decrease of 7418. The number of prepayment meters in use on that day was 76,778, compared with 65,018—an increase of 11,760, and giving a net total increase of 4342 meters. During the year, 30,629 meters were repaired.

Gas Cooking Appliances.—The policy of giving out all domestic cooking appliances on loan, free of charge, which was inaugurated in March of last year, has led to an enormous demand for all kinds of these appliances. At times the orders have been so numerous that the Gas Department has had great difficulty in coping with the work, even though much assistance has been obtained from master plumbers and others. The number of cookers and grills on loan on the 31st of May last was 145,142, compared with 100,693 for the preceding year—an increase of 44,449.

Gas-Heating Appliances.—The adoption of the hire system for gas-fires, radiators, &c., to consumers in June of last year has resulted in a great increase of business. Up till that period, these appliances were only given out on the hire-purchase system; and the number in use on May 31, 1912, was 4599. On May 31, 1913, the number on hire was 12,589. In addition to the hiring-out of heating appliances, 657 were sold outright during the year, and 1792 heating appliances were supplied on hire-purchase terms.

The number of gas-engines in use, and the total brake-horse-power, for the past year and the preceding year were as follows;

	Number.		Brake-Horse-Power.
May 31, 1912	1471	..	19,299½
May 31, 1913	1409	..	20,454½
Decrease	62	Increase .	1154¾

Mains.—About 9½ miles of new mains were laid during the year, which brought the total up to 1048 miles.

WORKS AND PLANT.

The Committee report that the first half of the vertical retort installation erected at the Dawsholm works has been in constant operation for nearly a year, and is giving good results. The second half of the installation will be put to work, as required, during the autumn. A section of the old retort-houses at Dalmarnock has been cleared out, and suitable foundations have been put in for carrying two benches of vertical retorts. The brickwork of one bench is well advanced, and ready for the steelwork platforms; and the second bench is being proceeded with. This first installation of 80 retorts, when completed, will increase the gas-producing power by upwards of 2 million cubic feet per day.

The Corporation have acquired the ground and buildings adjoining the Dalmarnock works formerly occupied by Messrs. George Miller and Co. These chemical works will be put in order, and efficient plant installed to deal with the tar and ammoniacal liquor which will be produced when the new vertical retorts are in operation.

Consequent upon the very large increase in the work of the distribution department, the workshops at Walls Street are now too small to

deal with the immense output of appliances required by the consumers. It has therefore been arranged to divide the work of the gas area into two sections; the district work for the north side of the Clyde being still directed and dealt with from Walls Street, while that for the south side of the river will be dealt with from new premises in Milan Street, where workshops are being arranged on property purchased by the Corporation. Part of the ground acquired there will be utilized for extending the coal storage at the Tradeston Gas-Works, which at present is inadequate.

PRICE OF GAS.

Having regard to the favourable result of the year's operations, and notwithstanding that the coal required next year has been contracted for at prices in advance of last year, the Committee recommend that the scale of charges within the city supply district, according to quantity consumed, should be as follows: For lighting and domestic purposes, 1s. 11d. down to 1s. 8d. per 1000 cubic feet; for power and manufacturing purposes, 1s. 11d. down to 1s.; for hotels, clubs, and institutions, other than supplies for lighting, gas-fires, and radiators, 1s. 11d. down to 1s. 4d.; prepayment meter supplies, 2s 5d.; public lamps, 1s. 6d. Within the supplementary supply district, 50 per cent. extra per 1000 cubic feet will be charged on the above-mentioned rate, except in the parish of Old Kilpatrick, where the additional charge will be only 2d. per 1000 cubic feet.

WORK OF THE STAFF.

The Committee conclude by expressing their pleasure in recording their appreciation of the efficient manner in which the work of the department was carried out by the Engineer and General Manager (Mr. Alexander Wilson, M.Inst.C.E.) and the whole of the staff during the year.

STATISTICAL STATEMENTS.

The report of the Committee is followed by the accounts of the Gas Department set out in the usual form; and an appendix contains (*inter alia*) memoranda of gas made, sold, &c., for each year from that ending May 31, 1901, down to the last. We give below the particulars for the past two years.

Memoranda of Gas Made, Sold, &c.

—	Year Ending May 31, 1912.	Year Ending May 31, 1913.
Quantity of gas made . . . cubic feet	7,207,621,000	7,732,914,000
Do. sold or accounted for . ,,	6,557,184,884	7,070,833,972
Do. unaccounted for . . . ,,	650,436,116	662,080,028
Do. do. . . . . per cent.	9·024	8·561
Average price received per 1000 feet sold .	1/10·754	1/10·588
Average price per ton of coal carbonized .	10/4·779	11/4·226
Cost of coal per 1000 cubic feet of gas made	11·90d.	1/1·07
Capital employed per 1000 cubic feet of gas sold	6/10	6/5
Coal in stock at beginning of year . tons	92,467	61,972
Coal received during year . . . . ,,	657,047	764,377
Coal carbonized during year . . . ,,	687,542	741,838
Coal in stock at close of year . . . ,,	61,972	84,511
Quantity of coke sold . . . . . ,,	298,729	307,178
Average price received per ton of coke .	8/7·8	10/0·837
Quantity of coke sold, per ton of coal carbonized	8·668 cwt.	8·281 cwt.
Average price received for ammoniacal liquor and tar per ton of coal . . .	5/2·526	5/5·878
Quantity of gas made per ton of coal . .	10,483 c. ft.	10,424 c. ft.
Quantity of gas sold or accounted for, do. .	9,537 ,,	9,531 ,,
Quantity of gas unaccounted for, do. . .	916 ,,	893 ,,
Illuminating power of gas prescribed . .	14 cand.	14 cand.
Illuminating power of gas supplied . . .	18·5 ,,	18·05 ,,
Number of public lamps—flat-flame . .	1,875	881
,, ,, ,, incandescent .	29,471	28,974
Number of stoves on hire	—	558
Number of stoves and grills on loan . .	100,693	144,584
Gas-fires sold—hire-purchase system . .	2,784	6,391
Gas heating and cooking appliances sold .	3,962	657
Number of meters in use—ordinary. . .	217,523	210,105
,, ,, ,, —prepayment .	65,018	76,778
Capacity of holders—cubic feet	44,376,000	44,376,000
Greatest quantity of gas delivered in one day, cubic feet	35,290,000	34,829,000

STOCKPORT CORPORATION GAS UNDERTAKING.

Annual Report of the Engineer.

At the Meeting of the Stockport Town Council last Wednesday, the report of the Engineer (Mr. S. Meunier) for the past financial year was presented. In the course of it, he offered the following remarks.

Though the estimated additional costs referred to in the last annual report have been fully borne out in the last year's working, yet it is a pleasure to record that, in face of probabilities, there have been substantial increases in the revenue from gas and residuals which have reduced the anticipated loss on the net profits to £3424 only. Gas-rental shows a net increase of £1966; coke has gone up by £3024; tar, £2394; liquor, £203; and cyanide, £24—a total of £5846, which with sundries (£334) and oxide (£200) gives a substantial advance in revenue of £6180. Stove-rents and fitting account for a further improvement of £791; so that the total increase in revenue amounts to £9338. Manufacturing charges have increased by £5786, of which coal represents £4294, and wages £932. Carburetted water gas is up £2257, of which oil accounts for £2197. Maintenance of works cost an additional £1111, and distribution £944—fairly evenly divided between wages and materials. Public lamps are up £858; management charges, £430 (of which £282 is increased wages); rent, rates, and taxes, £426; and meters, fittings, and stoves, £1952, of which £1123 is accounted against the increased cost of material. This leaves the gross profits at £42,980, against £47,314 in the preceding year, or £4334 less. Depreciation is down £1010; leaving the net profits £23,332, against £26,656—a diminution of £3324.

As regards working results, there are slight increases in the quantity of coke and tar made for sale per ton of coal carbonized, and a slight decrease in the ammoniacal liquor and gas results. This may be accounted for by there having been used a rather heavier percentage of medium coals, due to the high prices being asked for by the majority of the collieries. There is a considerable reduction in the percentage of unaccounted-for gas—this being 6·54 against 8·24; and the assumption of last year that the automatic meter collections were having a material effect upon this figure has been justified by the result of experiment in speeding-up during the March quarter.

Coal prices are again advanced, though not quite to the same extent as last year; and oil, which it was expected would be reduced materially after the 1st of January, has, on the contrary, hardened considerably; the lowest price obtainable just now being about 4⅝d. per gallon. Our present contract is, therefore, being carefully nursed, and the plant is being used as little as possible; the difference being made up by additional coal-gas retorts being employed. It is hoped that the present market for residuals, though showing signs of weakening, will not do so to such an extent as to overcome the benefits of any increase in the quantity to be made for sale, which will be the outcome of the present policy of using coal instead of oil, and so enable the department to minimize the additional costs for material, &c., which are still being placed upon it.

Alderman FERNLEY, the Chairman of the Gas Committee, in moving the adoption of the report, said the total increased expenditure on the year was £13,770; and if they had had to take this sum from the profits of the undertaking, it would have been a very serious matter for the ratepayers—an increase of something like 7d. in the pound on the rates. Fortunately, however, the better market for residuals came to the Committee's rescue, and they were enabled to get enhanced prices to the extent of £6190; while, notwithstanding the competition of electricity, which they felt to a certain extent, other items of income brought up the total increase under this head to £10,430. Therefore, their total loss of profits compared with the previous year proved to be only £3340. Under the circumstances, he considered this was a source of great satisfaction; and he could only hope that during the coming year they would have the same good fortune, though at the present moment he could not see that this was probable, as it was at this time last year; the market for residuals not being in the same healthy state.

The report was adopted.

BURNLEY GAS-WORKERS' WAGES AND HOLIDAYS.

A letter has been received from the Local Government Board sanctioning the borrowing by the Burnley Corporation of £4200 for the purposes of the gas undertaking—a deduction of £800 from the amount required having been made by the Board for wages of permanent workmen.

The Gas Committee, at a recent meeting, decided to recommend the Council to protest against the action of the Board, on the ground that it is calculated to increase the amount of casual labour. At the meeting of the Council last Wednesday, Alderman Emmott, the Chairman of the Committee, stated that they kept a regular staff to lay new mains and effect repairs. They thought the attitude of the Board very unfair. If the Committee employed fresh men on each job, the Board would recognize the cost as capital expenditure; but because the work was done by the regular staff, the wages must come out of revenue. The Committee would consider in future, when they wanted money for mains and lamps, whether it would not be worth while to meet the expense out of revenue, and save appealing to the Board. The Council decided to write to the Board protesting against their action.

Messrs. Albert Lees and Lewis Burrows, as a deputation from the National Gas Workers' Union, appeared before the Gas Committee and asked for one week's holiday with pay for all workers in this department. The Committee agreed to recommend the Council to grant to all employees of the department who have not previously had holidays with pay, and who have been employed during the whole of the preceding year, one week's holiday with pay, and to others, who have been employed during a portion only of the preceding year, holidays with pay proportionate to the period of employment.

At the Council meeting, Alderman Emmott stated that a similar application had been before the Committee on several occasions, but they had not acceded to the request. On the present occasion, however, they had information placed before them in such a way that they really could not disregard it. Out of 37 towns, there were only one or two which did not grant holidays with pay. Nelson, Colne, Blackburn, and other towns in the immediate vicinity, had already granted what was asked for at Burnley. There were 47 servants of the department already drawing wages with pay; and to grant the same to the others would cost the department about £400 a year. Personally, he was not in favour of the principle of paying for time not worked by men paid by the hour; and he did not do it in his own works. But as a department the Council were bound to do what their neighbours did. The Committee's recommendation was adopted.

Accident to the Brierley Hill Gas Manager.—We are sorry to learn that Mr. W. C. Jones, the Engineer and Manager of the Brierley Hill Gas Company, met with a serious accident last Thursday, while travelling with his daughter in a motor tri-car. It appears that when he was descending the steepest part of a hill the car swerved across the road and was overturned. Assistance was promptly forthcoming, and it was found that Mr. Jones's head had come into contact with the kerbstone and that he had received a severe scalp wound. He was unconscious, and was removed to the hospital at Stourbridge. He was still unconscious on Friday night, when his condition was serious. Fortunately Miss Jones escaped with slight injuries.

ILKESTON CORPORATION GAS UNDERTAKING.

Gas Profits—A New Financial Scheme.

Though recent experience of discussions at meetings of the Ilkeston Town Council, when questions relating to the management of the Corporation gas undertaking have been under consideration, appears to have precluded reasonable ground for the expectation of an entire elimination of personal recriminations, there were fortunately so many features of a more acceptable character arising out of the proceedings at the last assembly, that the *tu quoque* element for the nonce took a secondary place. The seeming impossibility of its entire eradication was again illustrated; but the bickering was swamped by the general congratulations regarding the eminently successful results of the year's working of the chief municipal trading concern. The Ilkeston authority has had of late to bear such an amount of official and other sharp criticism upon matters connected with the gas undertaking, that those responsible for the administration of affairs might well have been forgiven the desire to be relieved of the whole business; but a new financial *régime* has now been inaugurated, designed to lighten the weight of obligations, and presenting the possibility of the gas supply becoming increasingly lucrative to the town. Deprived of the aid which this department of municipal activity supplies towards the reduction of local burdens, Ilkeston ratepayers might feel the pinch in no uncertain style; other corporate ventures having proved far from remunerative. From their point of view, therefore, it was no doubt gratifying to learn, from the information forthcoming at the meeting referred to, that the profits from sales of gas had largely exceeded those of the previous year; Mr. Macdonald explaining that the amount was £2988, compared with £2491. This, he observed, had been accomplished in face of many difficulties; and it was hoped that in the next twelve months, with the new gasholder at work, even better results would be achieved. He announced that the Gas Committee intended to pursue a very forward policy; it being proposed to establish at the gas-works a showroom in which the best apparatus for heating, cooking, and other domestic purposes would be displayed. As Mayor's Auditor he had spent considerable time in going through the accounts; and he was glad to find that the profits had come out so well.

With regard to the case of Mr. Humphrys, the former Manager, now appointed Assistant at a salary of £150 per annum, it was reported that the Committee had written to inform him that there was no necessity to attend at the gas-works, except when he was required to do so either by the Committee or the Manager. Mr. Macdonald expressed regret that an attempt had again been made locally to bring Mr. Humphrys' case into the arena. The letter which had been addressed to him was quite formal in character; and when he attended the Committee meeting he knew what was going to happen. Work would be found for him from time to time; and he was guaranteed a salary of £150. Satisfaction was expressed by another member of the Council (Mr. Sutton) that the much-discussed Humphrys question had at length been settled.

Recent public inquiries had rendered it inevitable that some readjustments should be effected regarding local financial arrangements, particularly in their bearing upon the gas undertaking. Applications had been made to the local Government Board for a Provisional Order to amend the Ilkeston Corporation Act, 1898, and among the provisions which it was reported had now been assented to by the Board were: Power to overdraw at the bank or else to borrow temporarily for current expenses; sanction for the purchase of the Belfield Street property, the acquisition of which was rendered necessary by the explosion at the gas-works; and authority to purchase lands adjoining the works. The Town Clerk's report upon the matter indicated the manner in which the original offers of the Board had been altered and improved. As to the loans for gas-works purposes, Mr. W. C. Coxall (the Borough Accountant) and he were appointed to see the Board, and at the interview which took place statistics were presented showing that the Corporation were entitled to more liberal treatment than had at first been meted out to them. As a result, the first offer, amounting to an annual charge of £2676, was reduced to £1147—a saving of £1529 per annum. The Town Clerk was congratulated upon the outcome of his efforts in the matter; Alderman Sudbury observing that it was not until the gas-works disaster occurred that they fully realized their position, so that in this sense the catastrophe had been a blessing in disguise. It is therefore to be presumed that, with the assent of the Local Government Board given to the new financial arrangements, the last has now been heard of the process which was officially characterized at the time as one of "hoodwinking" the Board in relation to the change of plans for the holder at the gas-works; and in regard to this pacific settlement of the matter the Corporation may, in a manner, deem themselves fortunate.

GAS SUPPLY IN BULK IN THE POTTERIES.

An Offer to the Biddulph Council.

The question of purchasing gas in bulk again occupied the attention of the Biddulph (Staffs.) Urban District Council at a recent meeting, when the Deputy-Clerk to the Finance Committee submitted a letter from the Local Government Board stating that it was impossible to enlarge the Council's Provisional Order now before Parliament so as confer powers on outside authorities to supply gas in bulk on the boundaries. A letter was also produced from the British Gaslight Company (Etruria), stating the terms on which they were prepared to supply the Council with gas in bulk, providing statutory powers could be obtained. The terms included an agreement for fourteen years at 2s. 4d. per 1000 cubic feet—the cost of enlarging or laying mains to be borne by the Biddulph authorities.

Mr. T. H. Cole asked whether the members fully realized all that the letter meant. If they got their Bill through Parliament, and purchased the gas-works, they were absolutely under compulsion to work the concern themselves. The Bill was nothing but a paradox. It said it conferred on the Council powers to purchase in bulk, and yet other authorities were not permitted to sell. Who was expected to pay for the British Gas Company obtaining the necessary powers?

The Chairman (Mr. J. Copeland) said he certainly should not advocate the Council applying for powers for another authority. If they were going to buy gas in bulk, it would cost the parish £7000 or £8000. There was a sum of £3000 for the gas-works, the expense of the Provisional Order, the cost of purchasing an extra plot of land, the purchase of an engine and building, and the cost of new mains. As it would mean scrapping the gas-works, and paying 2s. 4d. per 1000 cubic feet for gas, he could not see how it would be much cheaper than at the present price. It would also give someone else the monopoly for supplying gas.

Mr. Cole agreed that if they bought gas in bulk, the expenditure would be considerable; but if they purchased the gas-works and made them their own, they would be facing a loss of from £500 to £1000 a year. No Council or engineer could conduct these gas-works at a profit.

In the result, it was decided to refer the offer of the Gas Company to the Council's Consulting Engineer.

Stafford Corporation and the Question.

At their last meeting, the Stafford Town Council approved the recommendation of the Gas and Electricity Committee that application should be made to the Local Government Board for a Provisional Order to enable the Corporation to supply gas to the parish of Brewood, and in bulk to any local authorities, companies, or persons outside the present prescribed limits of supply.

PUBLIC LIGHTING IN THE CITY OF LONDON.

Annual Report of the Engineer.

The report of the City Engineer (Mr. Frank Sumner, M.Inst.C.E.) on the works carried out by the Public Health Department of the Corporation of London during last year contains, as usual, details of both the gas and electric lighting.

Gas Lighting.

The number of gas-lamps (including experimental lamps) paid for by the Public Health Department of the Corporation at the end of the year was 2621; being a decrease of 27 in the twelve months. The larger proportion of the low-pressure burners (2321) consumed 4·25 cubic feet of gas per hour; the consumption of most of the high-pressure lamps being 10, 20, and 25 cubic feet.

High-Pressure Inverted Gas Lighting.

The high-pressure gas lighting in Fleet Street has been satisfactorily maintained throughout the year. No stoppages have occurred, and only a few defective lights have been observed.

Other High-Pressure Incandescent Gas-Lamps.

There are 113 other high-pressure "Keith" gas-lamps in the City thoroughfares, making 130 in all.

Low-Pressure Gas-Lamps.

The number of low-pressure gas-lamps at the end of the year was 2518, principally consuming 4¼ cubic feet of gas per hour each; the illuminating power being 60 to 70 candles. When possible, the lamps are fixed on brackets, about 60 feet to 70 feet apart on the diagonal, at a height of about 12 feet from the pavement level to the burner; the cost of each lamp, with gas at 2s. 2d. per 1000 cubic feet, being £3 5s. 7d. per annum, including maintenance of mantles, &c., but not capital charges.

The number of defective gas-lights observed and reported upon during the year was 2596—viz., feeble lights, 2523; lights failed, 25; not alight during the night, 1. In addition, 47 defects in lanterns, burners, &c., were reported to the Gaslight and Coke Company, and rectified. In accordance with the general instructions in force for many years past, the public gas-lamps were lighted whenever fog or unusual darkness occurred. This happened on 67 days during the year, and entailed an additional cost of £458 12s. 1d.

Experimental Lighting.

The experimental lighting by gas and electricity, which was instituted in 1910 for the purpose of ascertaining the most suitable form of illuminant for City streets, was continued by the respective Companies.

New Lighting (Gas and Electricity).

During the year the arrangements, which involved considerable time and thought, were concluded for a complete reorganization of the lighting of the City, in accordance with the recommendation of the Streets Committee, whereby the streets, courts, and alleys will be illuminated in about equal proportions by gas and electricity by the Gaslight and Coke Company and the City of London Electric Lighting Company respectively; and it is hoped that the major portion of the City will be completed before the winter months.

Electric Lighting.

The lighting of most of the main thoroughfares by arc lamps was continued throughout the year. The number of the original type of "open" electric lamps in lighting at the end of the year, at a cost of £26 each, was 329, or a decrease of 3. In addition, there were 94 "Oliver" and "Excello" flame arcs and 45 metallic filament lamps in lighting during the year. These lamps were lighted on 35 days when fog or unusual darkness occurred, at a total additional cost of £332 8s. 4d. The number of defective electric lamps reported in the year was 63. For these failures, deductions were made from the accounts, which amounted to £13 15s. 2d. during the year. The number of arc lamps in use on Dec. 31 last was 402; the price of the original "open" lamps being £26 per annum, and of the "Oliver" flame arc lamps (partly experimental) £17 10s. In addition, there were 21 experimental arc lamps and 45 experimental metallic filament lamps; making a total of 468 electric lamps.

FATALITY AT THE WEST HAM GAS-WORKS.

Unsafe Scaffold Ropes.

Mr. G. E. Hilleary, the Coroner for the Borough County of West Ham, held an inquiry last Tuesday relative to the deaths of Frederick Charles Keeling (27), Charles Richard Quate Smith (23), and Charles Minns (29), who were killed at the West Ham Gas-Works on the 1st inst.

Mr. MONIER-WILLIAMS (Messrs. Monier-Williams, Robinson, and Milroy) appeared for the Gaslight and Coke Company; while Mr. F. A. STERN and Mr. W. H. COWL represented respectively the contractors (Messrs. W. & G. Beaumont and Son) and the relatives of Smith. Mr. SIDNEY SHUTER, one of the Inspectors of Factories, attended from the Home Office.

Mr. MONIER-WILLIAMS stated that he was instructed by the Directors of the Gaslight and Coke Company to express their very deep regret at so terrible an accident as that in respect of which the inquiry was being held, and their sympathy with the families of the deceased.

Mr. STERN desired to associate himself with these remarks.

Medical evidence having been given to the effect that the deaths of Smith and Keeling were due to fractured skulls,

Percy Edgar Beaumont said the deceased men were employed by his firm in the work of painting No. 4 gasholder at the West Ham Gas-Works. They and a man named Marchant were working on a stage consisting of a plank 11 inches wide, 3 inches thick, and 18 feet long, secured by a 3½-inch Manilla rope each end. [Photographs were produced and handed to the Jury.] The stage was about 85 feet from the ground, and was made fast to the carriages guiding the holder. This was the way in which the work had been done for the past twenty or thirty years. He saw the tackle on the ground about an hour-and-a-half before the accident. He did not examine it, because he knew it had been examined by the foreman and was all right. The men fixed their own ropes, and had the option of throwing anything out that was the least defective. The rope which broke having been handed to witness, he said the lines were quite heavy enough to carry the strain put upon them; but it certainly looked as though there was a tear through overstraining. Much lighter lines were used for the work. At the time of the accident, two of the men were sitting on the centre of the plank and one was standing at each end. He could not give any history of the rope, as ropes were purchased from two or three different firms. Looking at it, he should say it had had an overstrain or an extraordinary jerk; but he failed to see how it would get this, because in the progress of the stage from the bottom to the top of the holder it had to be pulled up by means of the strop hanging from the carriage with a block suspended from it which hooked into the rope, so that it would have to stand a tremendous strain. It was the running rope that broke; the strop on the staging being intact. The ropes were kept in store, and examined by the foreman in the spring; and any that were found defective were at once thrown out. His firm had upwards of twenty years' experience on some of the largest works in the country; and this was the first time they had had any serious accident. He thought that this particular rope had been in use for one season.

A JUROR (after examining rope): I should say it had been in use for five years.

Witness, continuing, said he had examined the rope since the accident, and found a cut in it which might have been caused by catching on a piece of iron. It was a cut, not a break. The total weight of the stage was 3 cwt. 64 lbs., and taking the men at an average weight of 12 stone would make it about 6 cwt.; and the rope was supposed to stand a strain of 5 tons. He could not explain at all how the rope broke.

By Mr. COWL: He could not say how often the rope had been used; but it did not show any sign of hook wear.

By Mr. STERN: Their firm had painted the Tower Bridge and most of the large railway stations, and they had never had a fatal accident before through the breaking of a rope.

Charles Stevens, the foreman, said he examined the rope before he tied it on to the hauling-line for the men to pull up the stage, and it seemed quite right. He did not know the history of the strop; but it had only been at the gas-works, to which it had been sent by the Contractors, for five weeks, and it was the first time it had been used since it had been there. If he had not had enough men, he would have gone on the stage himself, and would certainly have trusted his life to the rope, which he should say had had about two seasons' wear.

By the JURY: There was no metal thimble in the bight of the rope that hooked on to the plank to take away the friction.

By Mr. COWL: He had the rope from the stores; but where it came from before then he did not know. He had been with Messrs. Beaumont for seven years; but he had never seen ropes tested there. He could tell whether a rope was good by simply opening it, and looking at the heart of it. This was done with all ropes, including the one in question.

William Marchant, a painter, said he was engaged on the stage with the deceased men. When the accident happened, he managed to catch hold of a rope, pulled himself up to the top of the holder and came down a ladder. He had been a seaman, and thoroughly understood ropes. He did not examine this particular strop before going up, but trusted to the others.

The INSPECTOR: Will you tell us what you think was the primary cause of that rope fracturing?

Witness [examining the rope]: Dry rot; you can pick it to pieces. Witness further stated that if a rope was exposed to wet weather, and then left in a store for some time, it would probably cause dry rot. The rope was a Manilla one, and he thought hemp ropes were best.

William Hagon, another painter, said before the rope was fixed, he examined it by twisting it and opening the strands, and it seemed to be a perfectly good one.

William Price, storekeeper, said he put the rope into store on the 30th of June last. He should say it was about two years old. He and another man had examined it, and they thought it was a perfectly good one. A rope like the one produced would be guaranteed to lift 10 tons. He would not say that in its present condition it would do this; but there was a great deal of difference between 10 tons and 5 tons. His idea was that the rope might have got into some chemicals used on the gas-works, and he did not think this would be noticeable.

Thomas Stackable, a labourer, stated that he had been a sailor, and knew all about ropes. He had examined the ropes in the store-room between the 15th of May and the 24th of June, and they were perfectly good.

By Mr. COWL: He had not examined the rope in Court since the accident. The rope was then handed to the witness, who, after examining it, said it was not very good—that the heart was pretty fair; but he should say it had been used a great deal.

Medical evidence was then given that the deceased Charles Minns died in the West Ham Hospital from shock and injuries sustained through falling into a tank.

The CORONER having summed up, the Jury returned the following verdict: "We come to the conclusion that the deaths were accidental, but we think it was negligence on the part of the employers, the builders, in sending a rotten rope to the job; and we add a rider that there ought to be found on each rope, where the hook goes in to the strop, where the break was, a thimble."

Mr. William Thorne has given notice of his intention to ask the Home Secretary to-night "whether his attention has been called to three men being killed at the West Ham Gas-Works on Friday, the 1st of August, in consequence of the painting-cradle falling, through a rotten rope being used; if he is aware that the Coroner stated that he hoped the Factory Inspectors who were present at the inquest would recommend a better system of testing the ropes; and if he is prepared to grant powers to local authorities to enable the local inspectors to examine ropes attached to all such painting-cradles, and to inspect the chains attached to such Scotch derricks and cranes."

EMPLOYERS AND EDUCATION.

Reading Gas Company's Scheme.

In a long letter on the above subject which appeared in the Educational Supplement to "The Times" for the 1st ult., Mrs. M. Cloudesley Brereton explained the scheme started by Sir Corbet Woodall for the training of youths for gas fitting and other work. She pointed out that the scheme had passed the experimental stage, and said it could not fail to interest a very wide circle of persons, whether they were engaged in education or in business. Attention was further called to the subject in last Tuesday's supplement by Mr. D. H. Helps, of Reading, who offered the following remarks.

I feel sure that we have suffered owing to the gradual decline of the apprenticeship system. Nowadays youths go into factories, and long before many of them are efficient workmen they ask for wages which they are not qualified to earn; and if their demands are not granted, they give up their work or drift into ordinary labourers or loafers.

It may be of interest, and perhaps of value, if you publish an account of the system which my Company started here for the education of our fitters and fitters' mates in the year 1909. We then arranged with the authorities of University College, Reading, for the inclusion among their evening classes of one in gas-fitting and gas supply. Our own district superintendent is the tutor and lecturer. The scheme has, I think, proved a great success. All students have to pay a fee of 5s., half of which my Company pay under any circumstances, and the other half is refunded to each student who attends 75 per cent. of the lectures. Mr. W. Hole, of Leeds—a well-known authority on gas distribution—holds an examination at the end of each session, and certificates are awarded by the College authorities. My Company also give a first and second prize, value £3 3s. and £1 11s. 6d. respectively. Some of the students also sit for the examination conducted by the City and Guilds of London Institute in "Gas Supply," and two years ago one of them obtained the bronze medal offered by the Institute.

Grants are made by the Board of Education to the Reading University College in connection with these evening classes. Originally the College authorities insisted that students attending the classes in gas-fitting and gas supply should also attend classes in building construction and the properties of matter during the first year's course, and in machine construction during the second year. We found, however, that this really interfered with the success of the scheme, for men and youths working as fitters and fitters' mates throughout the day could hardly be expected to attend two or three evening classes during the week. Again, it was found that all of them did not take sufficient interest in the classes in building construction, &c. Of course, if a student wishes, he can attend these classes; but it is not now compulsory for him to do so.

I would add that the instruction in gas-fitting and gas supply given at Reading University College is not confined to workmen or others in my Company's employ; anyone may attend the classes. We also take a few apprentices, who pay us a premium. These lads, in addition to attending the classes at the College, are also placed with the best of our fitters, and given other advantages beyond those granted to the ordinary fitter's mate.

Marple Gas Supply.—The annual report of the Gas Engineer and Manager of the Marple Urban District Council (Mr. J. K. Law), which has just been presented, shows an increase of nearly 2,500,000 cubic feet in the make of gas; the figures being 25,586,000 cubic feet for 1912, and 27,761,100 cubic feet for 1913. At the last meeting of the Council, it was decided to open a gas-stove and fittings show-room in the neighbourhood; and also to subscribe to the British Commercial Gas Association, at a rate of 2s. 6d. per million cubic feet of gas made per annum.

COKE AND GAS MANUFACTURE IN BELGIUM.

According to an article in a recent Engineering Supplement to "The Times," there is no indication of over-production in the manufacture of coke in Belgium; and, in spite of the large extensions of works carried out or in progress throughout the industry, there is still a tendency to increase the capacity of existing plants. Operations have recently been started at Boussu by the Charbonnages de l'Ouest de Mons with a new battery of thirty ovens, and a second battery the same size is being completed. At Bray, in the Centre district, the Charbonnages de Bray-Maurage have also begun to work with their new coke-oven plant, which is designed to supply gas as a bye-product to Mons and a number of neighbouring communities; while at La Louvière, in the same district, the Charbonnages de Sars Louchamps are contemplating the erection of a new large battery with bye-product recovery.

The work of erecting the two batteries of 38 units along the Maritime Brussels Canal at Vilvorde is progressing; and this plant, which will provide for the recovery of bye-products, will be among the most important of the kind in Belgium. Special coal-discharging appliances of 90 tons per hour capacity, and large warehouses to contain 25,000 tons of coal to be imported from Germany or England, will be erected. At first, it was proposed to deliver the gas obtained as a bye-product from these ovens (about 1½ million cubic feet a day) to the municipal gas-works at Brussels; but finally an offer from another company was accepted at the rate of 8d. per 1000 cubic feet.

The authorities of Liège, after having exercised their right to take over the privately-owned gas-works, have decided to grant to a new Company, formed by the Société des Fours à Coke du Nord at Hoboken, the concession for the manufacture of gas to be supplied to the city. According to the contract, all the gas necessary will be manufactured by means of the existing installations, and will be supplied at 1s. 1½d. per 1000 cubic feet until July 1, 1915. From that date to July 1, 1930, an additional supply will be obtained by means of coke-ovens to be erected for the purpose; and the price will be reduced to 7½d. per 1000 cubic feet. The contemplated plant will include forty to fifty units, and the preparatory works will shortly be taken in hand.

BIRMINGHAM CORPORATION WATER UNDERTAKING.

Additional Money Powers—The Third Pipe Line.

At the last Meeting of the Birmingham Corporation, the presentation of the report of the Water Committee, containing some important financial proposals, gave rise to considerable discussion.

Alderman J. H. Lloyd, the Chairman of the Water Committee, in presenting their report, moved that the Council apply to the Local Government Board for a Provisional Order to alter or amend the Birmingham Water Act of 1892, so as to permit the Board to sanction loans from time to time to carry out works already authorized by the Act. He said that, when reporting in May, the Committee informed the Council that the increase in the consumption of water during the past two years had been at the rate of 4½ per cent. compound. If an average rate of increase of consumption of only 4 per cent. were taken, it was evident that by the summer of 1918 they would be bringing the full daily average draught of water from Wales all the year round and, notwithstanding stand-by sources for times of drought, a further supply from Wales would be required. Practically throughout the month of June they were taking the full yield of the aqueduct—25 million gallons a day. The Committee were not asking the Council to consent to an expenditure that day, and therefore there was no report from the Finance Committee. This was the prelude to large expenditure the next few years. What they asked the Council to do was to decide by what means further money should be obtained when required. The provision of another pipe from Wales, as contemplated in the 1892 Act, could not be delayed much longer. They had parliamentary powers for six pipes, of which only two had been laid; and the time had arrived to prepare for the next instalment. The need had come somewhat sooner than had been expected; and, unfortunately, the income had not kept pace with consumption. If it had done so, it would have been the subject of rejoicing instead of regret that another pipe was needed, and the water-rents—in other words, the turnover—would increase *pari passu* with the consumption. The fixed charges of the undertaking would be spread over a turnover 50 per cent. higher, and would therefore be much reduced per 1000 gallons. The city might be congratulated that there was a bountiful supply of water in the Elan Valley. Though they had to send down the River Wye 27 million gallons every day in the year, observations confirmed the original opinion that the rainfall was ample to supply Birmingham and the district with water for six pipes, or 75 million gallons a day. Of this quantity, they were now bringing from Frankley 25 million gallons by two pipes of 12½ million gallons capacity each. A third pipe would therefore complete half the supply provided for under the Act. The huge compensation reservoir and two other reservoirs had already been constructed; and the foundations of the Dolymenach dam were ready for another of the three remaining reservoirs still to be built. All calculations showed that the existing reservoirs were ample for a third pipe at any rate. On the aqueduct, the tunnels and the conduit portions—altogether about 36 miles out of the 73 miles—had already been completed; leaving 37 miles, the distance for which a third pipe would be required. The Committee did not come forward with any proposals as to whom the work was to be entrusted—whether it would be done by contract or administration; nor did they submit any estimate. It would only be a guess if they did. Though figures had been mentioned, they were unauthorized; but the amount to be spent over the next five years would probably be found to be £700,000. How was the money to be raised? Their existing borrowing powers were exhausted, except for £182,554, which was clearly insufficient for their needs. The Committee therefore asked the Council to approve of the method recommended by the Town Clerk—viz., that of applying to the Local Government Board for the necessary authority sanctioning loans from time to time as required. Each extension would have to be submitted to the Council, and the amount proposed to be spent fixed, before the applications were submitted to the Board. In view of the great increase which had taken place in the consumption of water, it was important to know whether or not waste was taking place. Undoubtedly, there was a good deal of waste which might be avoided if people were less careless in their use of water. But it was mainly of a character which could be corrected by individual care and education rather than by detection. That the Water Department was not unmindful of the necessity for avoiding waste was shown by the fact that they had no fewer than fifteen inspectors in the city, whose principal duty it was to report faulty fittings; and 20,000 cases a year were detected and stopped. The inhabitants could do a great deal in checking waste, if they cared to take the trouble to do so. Looked at broadly, it could not be said that the use of water per head of the population was excessive. A suggestion had been made that it might be possible to supply houses by meter, and thus make each householder more careful in the use of water. Existing Acts of Parliament did not allow this; and it was not likely that Parliament would consent to such a proceeding—a plentiful supply of water to each house being of great importance to the welfare of the community. Apart from this, it would not be economical. A meter for each supply could not be taken at less than £5, including fixing; and for 75,000 meters it would mean an outlay of £375,000. Interest on this, with 10 per cent., for depreciation, would amount to £56,000 a year; so that the remedy would be worse than the disease. Whether by providing additional storage at Frankley a third pipe would be postponed had been carefully considered, and the Committee had to abandon the idea, inasmuch as they were already taking the full flow of the aqueduct; and by the time a reservoir could be constructed the full flow would be taken for so large a portion of the year as to make it impossible to refill the reservoir when drawn.

The motion having been seconded,

Mr. Luckman moved, as an amendment—"That it be an instruction from this Council to the Water Committee to appoint an independent Special Committee from members of the Council to investigate the whole working of the Water Department, and to confer with the Water Committee and report to the Council with as little delay as possible." He said he did not wish to cast any reflection on the Water Committee; everyone must appreciate the difficulty of the task they had to perform. But he thought the appointment of such a Committee as he had proposed was advisable in the interests of the ratepayers.

Mr. Perry seconded the amendment.

Mr. Lovatt moved another amendment as follows: "That before any application to the Local Government Board be sanctioned, the Water Committee furnish this Council with figures and information as to the need of the construction of further works, and the probable cost thereof."

Mr. Heath seconded this amendment.

Mr. Luckman's amendment was ruled out of order; and he subsequently proposed one framed as follows: "That this Council refuses to consider the granting of further powers for sanctioning loans for water purposes until an independent investigation into the working of the department has been held."

Mr. Lovatt's amendment was dropped.

Alderman Lloyd having replied to the discussion which had taken place,

Mr. Luckman's second amendment was put and lost; and the Committee's resolution was carried *nem. con.*

Alderman Lloyd then proposed that the Council should apply to the Local Government Board for a Provisional Order altering or amending the Birmingham Corporation (Consolidation) Act 1883 as regarded water supply, so as to permit the Council to adopt from time to time, subject to the sanction of the Board, scales of charges for the supply of water for domestic purposes at rates based upon a percentage of the rateable value of the premises supplied. He said the Council had agreed to the mode by which the necessary capital must be provided; and he now asked them to give their attention to the question of income to meet the additional interest and sinking-fund charges involved.

The motion was carried without opposition; and the report of the Committee was agreed to.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Glasgow.—Suffering from injuries to the head and face, Charles Christienson has had to be sent to the Royal Infirmary for treatment. He resided at the Popular Hotel in Buchanan Street, and, having smelt an escape of gas in a passage, looked for the leak with a light. He found it, with the result mentioned above. His injuries, however, are not of a very serious nature.

The water accounts of the Corporation indicate a revenue of £243,955, to which has to be added £13,298 from the hydraulic power works and £2463 from the river supply works. These, with the balance brought from the previous year of £12,675, make the total receipts £272,393. The total expenditure, including that upon the hydraulic power works and the river supply works, amounts to £204,714; so that there is a balance of £67,679. The amount to be carried to sinking fund account is £71,518; the debit of £3839 has been placed to the revenue account for the coming year. The Loch Arklet dam is complete, and the two new 36-inch mains to Craigmaddie are almost finished throughout their whole length. Damage occurred to the river supply works at Westthorn through the colliery operations; but this has not interrupted the supply. The details of the scheme for Loch Voil and Loch Doine are well advanced; preliminary surveys of the design are also as far forward as can be at the present time.

Airdrie.—At the meeting of the Town Council last Thursday, Bailie Goldie, the Convener of the Gas Committee, presented his report on the working of the gas undertaking in the past financial year, which bore evidence of the success of the new Manager, Mr. Dugald Currie. He said they started with a deficit and high-priced coal; and the result

of the year's operations was a balance of £6949 to be carried to the net revenue account. The total expenditure on this account was £5645; so that the deficit was wiped off and there was left at the end of the year a surplus of £1303. There was an increase of 7,479,000 cubic feet, or 8·8 per cent., in the quantity of gas sold. For the forthcoming year there was an estimated surplus of £943 on the net revenue account; and the Committee were of opinion that they would be acting wisely in reducing the price of gas by 2d. per 1000 cubic feet as from the 1st inst. This would bring down the above-named amount to about £200. Several members of the Council complimented the Manager on the gratifying results of the year's working. The Committee's recommendation in regard to the reduction in price was unanimously adopted, as was also one to increase Mr. Currie's salary by £50 per annum, as from the 15th of May last. The price of gas as from the 1st inst. is as follows: To ordinary consumers, 2s. 7d.; to consumers by prepayment meter, 3s.; to consumers for industrial purposes, 2s. 3d. for the first 10,000 cubic feet, 2s. 1d. for the next 20,000, and 1s. 9d. for any quantity beyond the total of 100,000 cubic feet.

Beauly.—The agreement with the Beauly Electric Supply Company has been adjusted after several of the provisions had been altered. The Consulting Engineer, Mr. T. Dalling, has been paid a fee of £13 to cover his claim. The Board of Trade have stated that the scheme is in accordance with their regulations.

Biggar.—The Convener of the Gas Lighting Committee has been authorized to have as many of the lamps fitted with inverted incandescent burners as he may think necessary; and these are to be ready for the coming lighting season.

Bo'ness.—The annual general meeting of the Gas Company was held on the 28th ult.—Ex-Provost Ballantine presiding. The Directors reported that the income amounted to £5354, and the expenditure to £4463; leaving a balance of profit of £891. Adding the sum of £842 brought forward, there was produced for disposal a total of £1733. The Directors recommended a dividend of 6 per cent., free of income-tax, after payment of which there would be a balance of £885. The Chairman, in moving the adoption of the report, remarked that the electricity works had evidently acted as an incentive, for when they started the Company were making 24 million cubic feet of gas per annum, whereas now they had exceeded 30 millions. In short, they had increased their make 25 per cent., which was highly satisfactory. The Manager (Mr. James Campbell) reported the substantial increase of 6·01 per cent. in the make of gas; the quantity produced from 3008 tons of coal being 30,294,000 cubic feet, or 10,071 cubic feet per ton. The amount received from residuals equalled 73·55 per cent. of the cost of the coal. The price of this was higher; but with the increased revenue from residuals, and the exercise of strict economy, the Company would be enabled to continue supplying gas at the same low rate of 2s. 11d. per 1000 cubic feet. The report was adopted, and the Directors and officials were thanked for their services.

Dollar.—The price of gas for lighting has been fixed by the Directors of the Gas Company at 5s. per 1000 cubic feet, and for cooking and heating at 3s. 11d. This is a reduction of 5d. on the lighting price and 2½d. on the cooking and heating price.

Falkirk.—At a meeting of the East Ward Committee, Mr. John Carr reported that he had visited the gas-works to view the operations being carried on there to obviate the sinking of the retort-bench, and that he and another member of the Committee were of opinion that the work being done would prove thoroughly satisfactory.

Inverkeithing.—Application has been made to the Dunfermline District Committee to lay mains in North Queensferry for the supply of gas by the Inverkeithing Gas Company. This was recommended by Mr. Henry O'Connor some years ago, and is now being actively proceeded with. The permission to lay the mains has been granted, subject to the usual conditions for opening roads being agreed to.

Lochore.—The Kirkcaldy district of the Fife County Council are arranging a scheme for the lighting of the streets of the villages of Glencraig, Crosshill, and Lochore, which will involve the erection of some sixty new lamps. Two lamplighters are to be appointed, as the self-lighting lamps in the district were a failure last year.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Aug.* 9.

Although the advance in the value of this article has not been very considerable during the past week, the position has continued strong, and all available supplies have been readily absorbed at full prices. Consumers have shown more interest, but are still disinclined to operate on an extensive scale; and the bulk of the buying has again been for dealers' account. The quotations at the close are £12 18s. 9d. per ton f.o.b. Hull, £13 per ton f.o.b. Liverpool, and £13 1s. 3d. per ton f.o.b. Leith. Nothing new has transpired in the way of actual business for forward delivery. Manufacturers are now asking still more money, but buyers refuse to follow them.

Nitrate of Soda.

This market is without change in either tone or value, and holders still require 10s. 7½d. per cwt. for ordinary and 10s. 10½d. for refined quality, on spot.

LONDON, *Aug.* 11.

Tar Products.

The markets for tar products have been quiet throughout the past week, and there is not very much business doing just at present, which, however, is the customary state of affairs at this time of the year. Pitch is steady but with little business doing; there being a wide divergence between the ideas of buyers and sellers. Continental consumers appear determined to withhold from purchasing unless they can do so on the basis of about 41s. to 42s. 1d. f.o.b. English port. On the other hand, makers are quite comfortable, and decline to sell except at very much higher prices. Business for prompt delivery has been done in one or two instances at low figures; and for forward delivery no dealing appears to have been done lately. It is, however, reported that offers have been made in the North at 43s. and refused by makers. Creosote is very firm. In London, it appears to be decidedly scarce, and it is doubtful whether business would be possible at anything under 3⅜d. to-day. In the Midlands, 3d. to 3½d. is asked; while in the North 2⅞d. to 3½d. is asked according to locality. Benzol is quiet, and there has been a good deal of reselling on the Continent on the part of consumers who made their purchases some time ago at low prices; but for use in this country, there is a good demand at present at fair figures. Fifty-ninety per cent. benzol is steady, and so is toluol. Although weak in London, it is in good demand in the North. Solvent naphtha is very quiet indeed; and business is reported to have been done for delivery to the end of the present year at exceedingly low prices. Heavy naphthas are neglected; the majority of consumers having covered their requirements. Creosote salts are in fair demand, and prices are well maintained. Heavy oils are in strong request, and fetching good prices all round. Refined naphthalene is unchanged with a fair amount of business doing. Carbolic acid is steady, but barely maintains the rise which took place a little while ago. Carbolic acid crystals are very quiet indeed, and there is keen competition for any orders which come into the market. Tar is selling at good prices; and there is still a fair demand for road purposes.

The average values during the week were: Tar, 26s. 3d. to 30s. 3d. Pitch, London, 41s. 6d. to 43s.; east coast, 41s. to 43s.; west coast, 41s. 6d. to 43s. 6d.; Manchester and Liverpool nominal; Clyde, 43s. to 44s. Benzol, 90 per cent., naked, London, 1s. 0½d. to 1s. 1½d.; North, 10¾d. to 11¼d.; 50-90 per cent., naked, London and North, 11¼d. to 1s. Toluol, naked, London, 10½d. to 11d.; North, 11d. to 11½d. Crude naphtha, in bulk, London and North, 5d. to 5½d. Solvent naphtha, naked, London, 10d. to 10½d.; North, 9d. to 10d. f.o.b. Heavy naphtha, naked, London, 10d. to 10½d. f.o.b.; North, 9d. to 9½d. f.o.b. Creosote, in bulk, London, 3⅜d. to 3 7/16d.; North, 2¾d. to 3d. Heavy oils, in bulk, London and North, 3½d. to 3¾d. Carbolic acid, casks included, 60 per cent., prompt, east coast, 1s. 4½d. to 1s. 5d., west coast, 1s. 3½d. to 1s. 4½d. Naphthalene, £4 10s. to £9 10s.; salts, 50s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This market has been very quiet throughout the past week, and there has been little alteration in prices. For prompt delivery the market is quiet, and low prices would have to be accepted to effect sales. For forward delivery, dealers do not appear to be very anxious to purchase; while makers ask a considerable premium. On London terms, £12 5s. is asked; while in Hull, £12 16s. 3d. to £12 17s. 6d. are the figures. In Liverpool, the quotation is £12 18s. 9d. to £13; and in Leith, £13. For forward delivery an advance of 5s. to 7s. 6d. a ton is asked. The exports for July this year as against last year show only a very slight decrease.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a steady demand in the Northern coal trade; and owing to the many local holidays, the production is barely adequate to the needs of users. In the steam coal trade, the tone is generally firm. Best Northumbrians are from 15s. 3d. to 15s. 6d. per ton f.o b. for prompt delivery; second-class steams are about 13s. to 13s. 3d. per ton; and steam smalls from 8s. to 9s. 9d. per ton f.o.b. In the gas coal trade, there is now a steady increase in the consumption, and some users are beginning to stock coal more freely, while the freights are relatively low. Best Durham gas coals are 15s. per ton f.o.b.; and second-class gas coals from 13s. 6d. to 13s. 9d. "Wear specials" are steady from 15s. 3d. to 15s. 6d. per ton f.o.b. There is little doing in new contracts just at the present time. Sales of cargoes are, however, still being negotiated for some of the Italian ports; and these show that rather lower prices are being offered for well-forward delivery. At the same time collieries having large contracts do not readily make concessions in price. Coke is quiet. Good gas coke is from 16s. 6d. to 17s. 3d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Throughout the week the market for Scotch coal has been firm, and prices continue to show an upward tendency. On the Glasgow Coal Exchange, on Thursday, the following were the prices quoted f.o.b. Glasgow: Ell, best brands, 12s. 6d.; splint, 12s. 9d. to 15s.; Navigations, 15s. 9d. to 16s. 9d.; ordinary steam, 11s. 3d. to 12s. 6d.; Hartleys, 14s. 3d.; trebles, 12s. 6d.; doubles, 12s.; singles, 11s.; pearls, 10s. 6d.; dross, 8s. to 8s. 6d.

Rhyl Gas Department.

The Gas Engineer and Manager of the Rhyl Urban District Council (Mr. Leonard G. Hall, Assoc.M.Inst.C.E.) has presented his working statement for the year ended the 31st of March last. The profit on revenue account was £6281; being at the rate of 2s. 1·7d. per 1000 cubic feet of gas sold, and 2s. 5·16d. per ton of coal carbonized. The net cost of gas, per 1000 cubic feet, into the holders was 9·92d.; being 18·85d. for manufacture, less 8·93d. for residuals. The net profit on gas manufacture was £3372; and the amount appropriated for the relief of the rates represents nearly 1s. 2d. in the pound. The quantity of coal carbonized was 5142 tons, and the make of gas, as registered by the station meter, was 64,075,000 cubic feet, of which 58,627,700 cubic feet, or 91·49 per cent., were sold—the rest being gas used on the works or unaccounted for. The make per ton of coal was 12,461 cubic feet, and the sale, 11,401 cubic feet. The residuals produced were: Coke, 3214 tons; tar, 62,200 gallons; ammoniacal liquor, 173,000 gallons. Per ton of coal carbonized, the figures were: Coke sold, 9 cwt.; tar made, 12 gallons; liquor made, 33·6 gallons.

The employees of the Gaslight and Coke Company have contributed £131 14s. 9d. to the Lord Mayor's Fund for the acquisition of the Crystal Palace.

The Antiquity of the Gas-Oven.

In the "Ironmonger" for the 2nd inst., reference was made by "Vulcan" to the paragraph on the early days of gas-cookers which appeared in the "JOURNAL" a few weeks ago; and he expressed doubt as to whether many ironmongers could, if asked, say offhand how many years they had been in use. A Blackpool correspondent, whose letter was published in last Saturday's issue, said he thought "Vulcan" was probably right. He enclosed a leaf out of "White's Directory of the Worsted District," in which there was an illustration of the double-cased gas-cooking apparatus then in use, and an advertisement of John Beverley and Son, ironmongers and gas-meter manufacturers, of Leeds, who supplied it. The firm named stated that they had then (1863) had thirty years' experience of gas-stove making, which would take us back to the year 1833; so that the gas-cooker must be at least eighty years old. The writer said he had "taken many of these old cookers in exchange during the last ten years."

Water Supplies and Financial Guarantees.

An interesting position has arisen in connection with the water supply to the parish of Hadley in the Wellington (Salop) Rural District. Some years ago, a proposal was brought forward by the Shropshire County Council to form a Joint Water Board for the eastern portion of the county, to include the Hadley district, which contains several iron and other works. It was mentioned that if Hadley were included in the scheme the district would have to contribute from £14,000 to £15,000 towards the cost. This was strongly opposed by the heads of local industries and property owners at Hadley when the Bill was before the House of Lords. The opposition was successful, and the scheme was dropped. Fifteen property owners of Hadley parish entered into negotiations with the Wellington Urban District Council for the parish to be supplied with water, and a guarantee of about £1600 was given for the cost of putting down the mains, &c. The water was laid on, and the additional cost on the annual expenditure was borne by the guarantors. At the last meeting of the Rural District Council the following resolution was considered: "That the Council take over from the guarantors of the Hadley water supply the rights, duties, and liabilities of the guarantors under the agreement with the Wellington Urban District Council, and that the Council supply water to the parish of Hadley in accordance with such agreement; and, further, that all costs, charges, and expenses incurred in taking over such rights, duties, and liabilities, and of the supplying of water, be charged as special expenses to the parish of Hadley." It was decided, however, to consult the Local Government Board on the matter.

Since 1900, the Middlesex County Council have made a net profit on their gas-meter testing-station of £12,065, which has been applied in relief of the rates.

Newcastle-under-Lyme Gas Undertaking.—During the last financial year, the Newcastle (Staffs.) municipal gas undertaking had a gross revenue of £6123; being an increase of £198. It was decided to allocate £500 of the profits to the relief of the rates, and devote the balance (£1710) to reducing the overdraft, now standing at £2289.

Rat Causes Gas Explosion.—An escape of gas from a pipe which had been cut through by a rat recently caused a serious explosion in the premises of Mr. J. J. Carrigan, at Letterkenny. The escaped gas had accumulated beneath the floor of the drawing-room, and a lighted match was used to locate it. A gas-works official was rather severely scorched about the face.

Bournemouth Gas and Water Company.—At the half-yearly meeting of this Company next Friday, the Directors will recommend dividends of 6 per cent. per annum on the preference shares, 7 per cent. per annum on the "B" ordinary shares, and 15 per cent. per annum on the original shares, all less income-tax. These will amount to £17,987, and leave £35,578 to be carried forward.

Chesterfield Gas and Water Board.—At a recent meeting of this Board, it was resolved that each member should be supplied half yearly, in the months of October and April, with a report of the work connected with the undertaking, in regard to both gas and water, and the progress of constructional work; also that a copy of the audited statement of accounts and balance-sheet should be supplied once in twelve months. In the course of a long discussion, it was stated that only two reports had been presented in the last ten years.

Bridport Gas Company.—The Company are paying dividends of 8 per cent., placing £100 to reserve, and carrying forward a balance of £968, against £801 last year. Though the cost of coal has increased, the price of gas has been reduced 1d. per 1000 cubic feet, and is now 3s. 6d. for lighting and 3s. for power purposes, with discounts. In the past financial year, 2750 tons of coal were carbonized (35 tons less than before); the sale of gas being 28,976,000 cubic feet—an increase of more than a million cubic feet. The Directors, to mark their appreciation of his work, voted a bonus to the Manager (Mr. W. H. Reed).

Charge of Stealing Gas-Fittings.—At Colchester, a few days ago, George Ernest Cook, a gas-fitter, was charged with stealing a quantity of gas-piping, gas-fittings, composition metal, and old pieces of mixed metals, of the value of £14 9s. 3d., the property of the Colchester Gas Company. Mr. Herbert S. Pike, the Company's Engineer and Manager, said the accused had been employed by them a little more than four years, and his wages were either 27s. or 29s. a week. According to the regulations, of which Cook was aware, all material left over at a job should be taken back to the storekeeper, and the rules did not permit the men to keep material at their houses. This had been done in the present case. Witness identified most of the property found there as belonging to the Company. Prisoner was committed for trial at the next Borough Sessions; but bail was allowed—himself in his own recognizances of £40, and two sureties of £20 each.

THE "DARWEN" ARCH PIPE

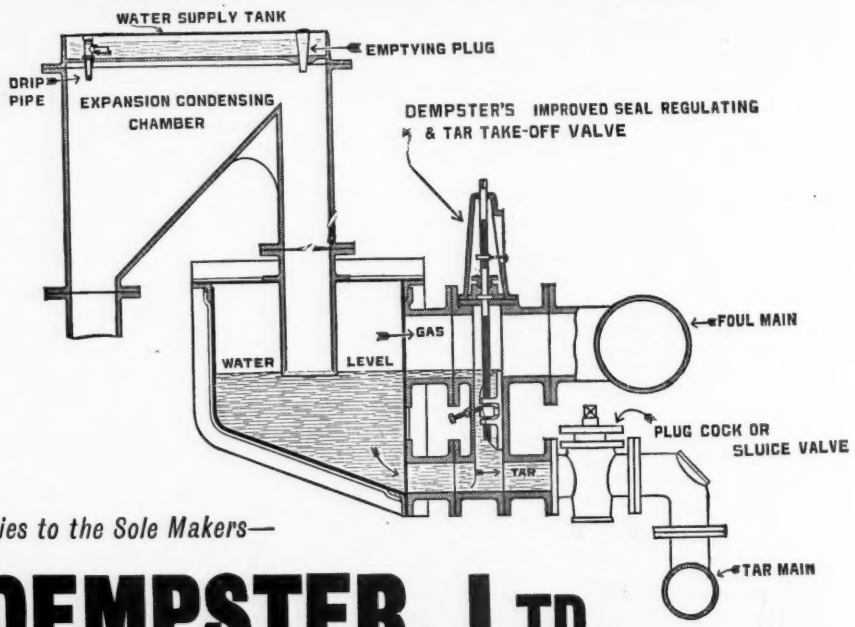
Prevents Stopped Ascension Pipes.

"The Cost is moderate and can be saved in a Single Season."

"The Arch Pipes can be seen in operation upon application."

"It will pay you to try them upon troublesome Pipes."

Upwards of 400 are already at Work or on Order.



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R. & J. DEMPSTER, LTD.,

GAS PLANT WORKS, **MANCHESTER.**

Wandsworth, Wimbledon, and Epsom District Gas Company.

The revenue account of this Company for the half year ended June 30 shows a profit of £32,734. After providing for the interest on debenture bonds and stock, on deposits and loans, and for compensation under the Wandsworth, Wimbledon, and Epsom District Gas Act, 1912, there remains a credit balance, with the addition of the balances brought forward from the amalgamated Companies, of £42,149. The Directors therefore recommend that dividends be declared at the statutory rates per cent. per annum as follows: On the Wandsworth "A" stock, £8 7s. 6d.; "B" stock, £6 17s. 6d.; "C" stock, £5 17s. 3d.; on the Wimbledon stock, £6 2s. 6d.; and on the Epsom stock, £6 12s. 6d.

Lyttelton (N.Z.) Gas and Water Supply.

According to the annual report of Mr. L. A. Stringer, the Town Clerk of Lyttelton (N.Z.), the revenue of the gas undertaking for the year ended the 31st of March (as shown in the profit and loss statement) was £4783, and the expenditure £4162—leaving a profit of £621, equal to 11 84d. per 1000 cubic feet of gas. There was a profit of £127 on fittings; making a total of £748. The following particulars in regard to the operations of the Gas Department are furnished by the Manager (Mr. W. M'Auliffe). The quantity of coal carbonized was 1122 tons; and the gas made 13,648,000 cubic feet, of which 12,579,700 cubic feet were sold. The make of gas per ton of coal was 12,164 cubic feet; the residuals being 7·47 cwt. of coke sold and 11·71 gallons of tar made. There was in the year covered by the report a continued satisfactory increase in the sales of gas—these being 12·48 per cent. higher than before. New services had been connected, the mains extended, and several Horstmann lighters fixed on trial on the public lamps had given entire satisfaction. Inside the works, the lighting and ventilation of the retort-house had been improved. The benches are in good order; and the old bed, which has been working for more than seven years, is producing upwards of 12,000 cubic feet of gas per ton of coal carbonized. The whole of the plant is reported to be in first-class order. In conclusion, Mr. M'Auliffe acknowledges the amicable and efficient manner in which the men on his staff carried out their work, and thus assisted in making the management of the Gas Department an altogether pleasant duty. With regard to water supply, the town consumption during the year was 73,441,300 gallons, or at the rate of 49·58 gallons per day per head of the population, compared with 43·12 gallons in the preceding year. The producer-gas plant which has been introduced in connection with the pumping plant, as mentioned in previous reports, continues in useful service; the fuel cost for the year working out at £2 16s. 3d. per million gallons of water pumped, inclusive of the power provided to lift about 9 million gallons of water from the cylinder well. The steam plant cost £13 18s. 5d. per million gallons.

Increased Price of Gas at Rathfriland.—The Rathfriland (co. Down) Gas Company have intimated an increase in the price of gas from 7s. 6d. to 8s. 6d. per 1000 cubic feet. Owing to the higher cost of coal and the rise in freights and in the cost of production generally the charge for power gas is to be 7s. 6d. per 1000 cubic feet.

Sewage Sludge for Gas Making.—At the suggestion of the Sewage Engineer of the Bradford Corporation, experiments have recently been made at the Thornton Road Gas-Works with sludge briquettes for the production of gas. They have been used in the vertical retorts; but though a fair quantity of gas is yielded by them, it is not of very good quality; the presence of a large amount of moisture being a deteriorating factor.

Gas for Power Purposes at Bradford.—It was mentioned in the "JOURNAL" for the 8th ult. that the Gas Committee of the Bradford Corporation had under consideration the question of reducing the price of gas for power purposes. They have now decided that, as from the 1st ult., the charge for gas used for engines within the city is to be lowered from 2s. 1d. to 1s. 6d. per 1000 cubic feet, less the usual discounts for prompt payment. The charge for power users beyond the city boundaries is 2s. 1d., with the usual discounts.

Fermoy Gas Company and the Profits on Fittings.—At the last meeting of the Fermoy Urban District Council, Mr. J. S. Troy, the Solicitor to the Council, wrote, in reference to the accounts of the Gas Company, that the Council had no power to appoint an auditor to investigate the Company's accounts, but that the Company were bound to furnish to the Council an annual statement, and, in default, were liable to a penalty of 40s. per day. It seemed to him that by omitting to deal with the profits from sale of fittings, &c., the Company were in default; the particulars being incomplete. It was ordered that the Solicitor should be instructed to take the necessary proceedings against the Company.

Leatherhead Gas Company and the Supply of Cobham.—The report adopted at the annual meeting of the Leatherhead Gas Company stated that there was a balance of £4423 available for division. The payment of a dividend making with the interim distribution 5 per cent. for the year was decided upon—leaving £3146 to be carried forward. The Directors reported that the recently acquired Cobham area was developing satisfactorily, and very much more gas had been sold. The public lighting of the area by gas during the past winter had been greatly appreciated. The Board had come to the conclusion that it would be advisable to link-up the Cobham works with Leatherhead, and to supply gas to the former by means of a high-pressure main. The laying of this main has been begun; and its cost will be defrayed by a further issue of shares and debenture stock. The Consulting Engineer (Mr. F. S. Cripps) reported that considerable economy was anticipated from the new high-pressure main, as well as the assurance of a plentiful supply of gas to meet the demands of the growing district.

WITHIN THE RADIUS

of most Gas Undertakings there is usually a large number of flats and small dwellings.

The ordinary Gas Cooker may be too large for these and the circumstances demand the use of small Cookers such as "MAIN'S"

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which are just large enough to meet ordinary purposes and just small enough to fit into a corner or recess.

These Cookers embody all the features which make the "MAIN" lines pre-eminent for efficiency and economy.

May be mounted on adjustable stand.

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Tokyo Water Supply.—A plan for the extension of the Tokyo Water-Works under consideration by the municipal authorities is designed to supply water for a population of 3 millions. The present system provides for a population of 1½ millions, whereas the total is now estimated to be upwards of 2 millions. The new plant is to include a reservoir, to be constructed about 25 miles from Tokyo, whence the water will be brought by pipes to a distributing centre six miles from the city, where filter-beds will be built.

Newtownards Gas Undertaking.—At a meeting of the Newtownards Urban District Council, Mr. Lavery, in announcing that the Gas Committee had a credit balance of £1043, said the gas undertaking was now in a flourishing condition, and had been gradually, but surely, increasing in prosperity since Mr. Roberts [this year's President of the Irish Association of Gas Managers] had come to them as Manager some twelve years ago. When they took over the gas-works in 1884, the output was 14 million cubic feet per annum. Now it was upwards of 41 millions. The value of the undertaking at present was £28,410, and they had repaid £13,940 of loans. In addition, they had contributed towards the reconstruction of the town offices, and for the last three years had given annually £230 towards the reduction of the rates.

Water by Meter in Madrid.—According to a report by the American Consul, the high cost of living in Madrid is to be further increased by installing water-meters. Under the old system, a fixed price per annum was charged for water, irrespective of the quantity used. It is estimated that the adoption of meters will at least double the cost of water. It is proposed, however, that the water brought to the city by the Isabel II. Canal shall be utilized for the production of electricity. It is estimated that 3000 H.P. can be developed and sold, and that the receipts can be used to reduce the price of water. It is thought that five or six years will be required to complete the Puenteviejas Water-Works. When these are finished, the two plants will have a storage capacity of 2155 million cubic feet, and a minimum of 9000 H.P. can be developed.

Price of Gas for Power Reduced at Walsall.—The Gas Committee of the Walsall Corporation have considered the charge for gas for power and manufacturing purposes, which is now 1s. 8d. per 1000 cubic feet, and have decided to make the following reductions: To consumers using 100,000 cubic feet and under per quarter, 1s. 7d.; over 100,000 cubic feet, 1s. 6d.; over 200,000 and up to 500,000 cubic feet, 1s. 5d.; and beyond this, 1s. 4d. Further, that all the accounts be subject to 2½ per cent. discount if paid within a month from the delivery of the demand-note.

Dublin Water Supply.—The Water-Works Committee of the Dublin Corporation have appointed the Chairman and Deputy-Chairman, with the City Engineer and the Secretary, as a deputation to visit Liverpool, Manchester, and the new reservoir at Chingford to report upon filtering and distributing arrangements, with a view, in connection with the new storage reservoir at Roundwood (which will enormously increase the amount of water available for distribution), to having the whole water-works system of Dublin brought into conformity with the latest scientific requirements.

York Water Company.—At the half-yearly meeting of this Company last Thursday, the report and accounts for the six months ended June 30, which were adopted, showed that the income was nearly £400 in excess of that for the corresponding period of last year. There was additional expenditure on repairs and renewals of engines and boilers, and another item of expenditure was the erection of a water-tower in place of the Severns Hill reservoir. The number of houses and tenements supplied by the Company was 20,000, excluding the consumers who are supplied in bulk; and this number showed an increase. To encourage the use of baths in houses, the Company had decided that from the beginning of October next a substantial reduction should be made in the quarterly charge for each bath. The following dividends per annum were declared: Preference shares, 1876, 5 per cent.; do., 1896 and 1900, 3½ per cent.; ordinary shares, 10 per cent.; new shares, 1878 and 1879, 7 per cent.

GAS COMPANIES' STOCK AND SHARE LIST.

The Stock Exchange had another abbreviated innings last week; but, short as it was, it was not devoid of sweetness, for the factors which have so long been making the course of markets rough were considerably smoothed out. In the Balkans, in China, and in South Africa, the trend of events seemed to warrant the relaxation of apprehension. Prices in many markets profited to a fair extent; while Consols were conspicuous with a gratifying recovery. A favourable tone was at once apparent upon the reopening on Tuesday; all news from the sources of unrest being encouraging. But the attendance was so limited, and business was so quiet, that movements lacked strength. Government issues were firm, and Consols steady. Rails were inactive but not weak. Americans showed more strength, as did the Foreign Market also. Business was not much accelerated on Wednesday; but there was a tone of cheerful contentment, and prices looked up in many markets. Gilt-edged securities set a good example, and Consols advanced ¼. Rails, though not without one or two doubtful spots, were stronger. Americans were still on the up-grade, and Foreign was very fair. The tone on Thursday was placid and firm. The conclusion of an agreement for peace—period of duration not fixed—in the Balkans was gratefully received; and markets seemed to be getting courageous. Government issues were again in the van of advance, and Consols rose ¼. Rails, however, were rather uneven—special circumstances affecting special lines. Americans, after some hesitation, were improving at the close; while the Foreign Market was very fair. On Friday, business was thought to be a shade more active; but the tone was only moderate. Consols inclined to be somewhat easier—not an unusual feature after a steady rise; and Rails were quiet and rather uneven. Saturday was, of course, inactive; but some little recovery was apparent. Consols closed at 73⅛ to 73⅜—a rise of ⅛ in the week. In the Money Market, there was not a full demand, and rates inclined easier. Business in the Gas Market was very fair in point of volume, considering the time of year, and prices in general were stronger. In Gaslight and Coke issues, the ordinary was fairly busy, and prices were a good ⅛ higher at 103 to 104; but the quotation was left unchanged until *ex div.* adjustment next account. In the secured issues, the maximum realized from 76 to 77⅛, the preference 98, and the debenture from 72¾ to 73½—a rise of ⅛. In South Metropolitan, business was quiet at 111 to 111⅜—a rise of ⅛; and the debenture marked from 72⅛ to 73⅛—a rise of ⅛. In Commercials, the 4 per cent. made 107, the 3½ per cent. 102½ to 104, and the debenture 69⅛ special. Among the Suburban and Provincial group, Brentford old was done at 264½ (a rise of 2), ditto preference at 114½, South Suburban at 117⅞ and 118½, and ditto debenture at 116 and 116½. In the Continental companies, Imperial changed hands at 162 to 164, Union at 80½, and European at 17⅞. Among the undertakings of the remoter world, Primitiva was done at 6 1/16 and 6 3/16, ditto preference 5 to 5 3/16, and ditto debenture at 94½.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment. £ s. d.
£			p.c.				
1,551,868	Stk.	April 11	5	Alliance & Dublin Ord.	66½–68½	..	7 6 0
374,000	,,	July 11	4	Do. 4 p.c. Deb.	80–83	..	4 16 5
280,000	5	April 11	7½	Bombay, Ltd.	6¼–6⅝	..	5 11 1
50,000	10	Feb. 27	15	Bourne- mouth Gas and Water { 10 p.c. B 7 p.c. Pref. 6 p.c.	28½–29½ / 15½–15⅝ / 13½–14½	.. / –⅛ / ..	5 1 8 / 4 8 11 / 4 4 3
347,500	10	,,	7				
75,000	10	,,	6				
380,000	Stk.	Feb. 27	14	Brentford Consolidated	262–267	+2	5 4 10
330,000	,,	,,	11	Do. New	200–205	..	5 7 4
50,000	,,	,,	5	Do. 5 p.c. Pref.	113–115	..	4 6 11
206,250	,,	June 13	4	Do. 4 p.c. Deb.	92–94	..	4 5 1
217,380	Stk.	Feb. 27	11	Brighton & Hove Orig.	206–211	..	5 4 3
244,200	,,	,,	8	Do. A Ord. Stk.	151–154	..	5 3 11
530,000	20	Mar. 28	12½	British	45–46	..	5 8 8
120,000	Stk.	June 27	4	Do. 4 p.c. Deb. Stk.	87–89	..	4 9 11
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	83½–91½	..	4 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	2–3	..	—
160,000	10	—	—	Do. 4½ p.c. Pref.	4–5	..	—
100,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	75–80	..	5 12 6
167,150	Stk.	Feb. 13	5	Chester 5 p.c. Ord.	139½–111½	..	4 9 8
1,513,280	Stk.	Feb. 27	5/9/4	Commercial 4 p.c. Stk.	105–107	..	5 2 1
660,000	,,	,,	5½	Do. 3½ p.c. do.	102–104	..	5 2 6
475,000	,,	June 13	3	Do. 3 p.c. Deb. Stk.	69–71	..	4 4 6
800,000	Stk.	,,	4	Continental Union, Ltd.	80–83	..	4 16 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	124–126	..	5 11 1
492,270	Stk.	—	5¾	Derby Con. Stk.	124–125	..	4 12 0
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
1,002,180	10	July 30	10	European, Ltd.	17–18*	..	5 11 1
16,386,669	Stk.	Feb. 13	4/17/4	Gas-light and Coke { 4 p.c. Ord. 3½ p.c. max. 4 p.c. Con. Pref. 3 p.c. Con. Deb.	102–104 / 75–78 / 95–98 / 72½–74½	.. / .. / .. / +½	4 13 7 / 4 9 9 / 4 1 8 / 4 0 6
2,600,000	,,	,,	3½				
4,062,235	,,	,,	4				
4,674,850	,,	June 13	3				
258,740	Stk.	Mar. 13	5	Hastings & St. L. 3½ p.c.	83–91	..	5 9 11
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—
70,000	10	April 25	11	Hongkong & China, Ltd.	17–17½	..	6 5 9
131,000	Stk.	Mar. 13	7½	Ilford A and C	152–155	..	4 18 4
65,780	,,	,,	6½	Do. B	120–122	..	5 0 5
65,500	,,	June 27	4	Do. 4 p.c. Deb.	87–89	..	4 9 11
4,940,050	Stk.	May 16	9	Imperial Continental	162–167	..	5 7 9
1,235,000	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	85–87	..	4 0 6
300,242	Stk.	Mar. 13	6	Lea Bridge Ord. 5 p.c.	121–124	..	4 16 9
561,000	Stk.	Feb. 27	10	Liverpool United A	208–210	–½	4 15 3
718,100	,,	,,	7	Do. B	146½–148½	–1	4 14 3
306,083	,,	June 27	4	Do. Deb. Stk.	96–98	..	4 1 8
63,480	Stk	June 27	3	Maidstone 3 p.c. Deb.	66½–68½	..	4 7 7
75,000	5	June 13	6	Malta & Mediterranean	4⅞–4⅞	..	6 3 1
250,000	100	April 1	4½	Met. of Melbourne { 4½ p.c. Deb.	98–100	..	4 10 0
541,920	20	May 30	4	Monte Video, Ltd.	12½–13	..	6 3 1
1,775,892	Stk.	July 30	4½	Newc'tle&G'tesh'd Con.	97–97½*	..	4 12 4
529,705	Stk.	June 27	3½	Do. 3½ p.c. Deb.	83½–84½	..	4 2 10
55,940	10	Feb. 27	7/7/0	North Middlesex 7 p.c.	13–14	..	5 4 7
300,000	Stk.	May 16	8	Oriental, Ltd.	124–129	.	6 4 0
60,000	5	Mar. 28	10	Ottoman, Ltd.	8¼–8⅝	..	5 14 3
60,000	50	Feb. 27	13	Portsea, Island B	125–128	..	5 1 7
100,000	50	,,	12	Do. C	122–125	..	4 16 0
249,980	5	May 16	8	Primitiva Ord.	5 13/16–6⅛	..	6 8 0
499,960	5	June 27	5	,, 5 p.c. Pref.	5–5⅛	+⅛	4 15 3
521,600	100	June 2	4	,, 4 p.c. Deb.	93–95	..	4 4 3
346,198	Stk.	June 27	4	River Plate 4 p.c. Deb.	90–92	..	4 7 0
275,000	5	Apl. 11	12	San Paulo, Ltd.	—	..	—
150,000	10	,,	6	Do. 6 p.c. Pref.	11¼–11⅜	..	5 2 2
125,000	50	July 1	5	Do. 5 p.c. Deb.	48–50	..	5 0 0
135,000	Stk.	Mar. 13	10	Sheffield A	225–227	..	4 8 1
909,984	,,	,,	10	Do. B	225–227	..	4 8 1
523,500	,,	,,	10	Do. C	224–226	..	4 8 6
90,000	10	May 30	7½	South African	9½–10½	..	7 2 10
6,429,895	Stk.	Feb. 13	5/9/4	South Met., 4 p.c. Ord.	110–112	+½	4 17 7
1,895,445	,,	July 11	3	Do. 3 p.c. Deb.	72–74	+½	4 1 1
209,820	Stk.	Feb. 27	8½	South Shields Con. Stk.	161–163	..	5 4 4
952,795	Stk.	Feb. 27	6	S'th Suburb'n Ord. 5 p.c.	117–119	..	5 0 10
60,000	,,	,,	5	Do. 5 p.c. Pref.	115–117	..	4 5 6
117,058	,,	June 27	5	Do. 5 p.c. Deb. Stk.	115–117	..	4 5 6
594,740	Stk.	May 16	5	Southampton Ord.	102–105	..	4 15 3
120,000	Stk.	Feb. 13	7½†	Tottenham { A 5 p.c. B 3½ p.c.	139–142 / 115–117	.. /	5 3 10 / 5 0 5
515,940	,,	,,	5½†				
149,470	,,	June 27	4	Edmonton { 4 p.c. Deb.	90–92	..	4 7 0
182,380	10	,,	5	Tuscan, Ltd.	5–6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	94–96	..	5 4 2
236,476	Stk.	Feb. 27	5	Tynemouth, 5 p.c. max.	114–115	..	4 6 11
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	..	..	Wandsworth A 5 p.c.	160–165	..	—
255,636	,,	..	..	,, B 3½ p.c.	132–137	..	—
108,075	,,	..	..	,, C 3½ p.c.	1 3–118	..	—
352,000	,,	..	..	Wimbledon 5 p.c.	110–115	..	—
98,000	,,	..	..	Epsom 5 p.c.	117–122	..	—
88,416	,,	June 27	3	3 p.c. Deb. Stk.	68–70	..	4 5 9

Prices marked * are "Ex-Div." † Next Dividend will be at this rate.

Messrs. William Hinton and Sons, of Funchal, have obtained a contract from the Municipality to furnish the city with proper drainage, and bring down a supply of pure water from the mountains.

Last Friday, £3000 worth of 5 per cent. perpetual debenture stock of the Maidenhead Water Company was sold by Messrs. Symmons and Son—a reserve premium of £10 being placed upon each £100 worth of stock. The stock was divided into £100, £50, and £25 lots.

The Directors of Messrs. C. & W. Walker, Limited, have resolved to pay an interim dividend for the six months ended July 31 at the rate of 5½ per cent. per annum, less income-tax, on the cumulative preference shares, and at the rate of 10 per cent. per annum on the ordinary shares, free of income-tax.

The text of the lecture on "The Working Fluid of Internal Combustion Engines," given by Mr. Dugald Clerk, D.Sc., F.R.S., before the Junior Institution of Engineers—a summary of which appeared in the "JOURNAL" for the 8th ult.—is now obtainable from Percival Marshall and Co., 66, Farringdon Street, price, 1s. 2d. by post.

The Richmond Gas Stove and Meter Company, Limited, recently held their 26th half-yearly conference of representatives at their Warrington works—Mr. H. M. Thornton presiding. The work of the half year was fully reviewed, and future developments were thoroughly discussed. Mr. Harold Hartley, M.Sc., the Chief Chemist to the Company, gave a comprehensive lecture dealing with many points of scientific interest in gas apparatus construction; and the three days' conference concluded by the representatives and heads of departments being entertained at dinner by the Directors of the Company.

The sixth annual flower and vegetable show in connection with the West Greenwich Gas-Works Institute was held on Saturday, the 2nd inst. We learn from the Hon. Secretary (Mr. H. P. Hollis) that the attendance was a record one, and the exhibits of a high order of merit. The opening ceremony was performed by the President, Mr. J. F. Braidwood, the Engineer-in-Charge. The arrangements were in the hands of the Committee, assisted by Messrs. W. King, E. Snow, and E. Ditch. During the afternoon, sports were held for the children; and the South Metropolitan Gas Company's band was in attendance.

APPLICATIONS FOR LETTERS PATENT.

17,241.—CAMERON, W., "Producing gas from liquid hydrocarbons." July 28.
17,250.—ARTHUR, E., "Water supply." July 28.
17,252.—TREVOR, S. R., "Distillation of carbonaceous material." July 28.
17,271.—DINNIS, A., "Pressure-reducing valves." July 28.
17,322.—KENNEDY, J. E., "Burners for stoves." July 28.
17,335.—AKTIEBOLAGET LJUNGSTRÖMS ANGTURBIN, "Gas-turbines." July 28.
17,344.—MURRAY, T. E., and GRADY, C. B., "Trapping particles in suspension in gas-currents." July 28.
17,371.—BACON, J. W., "Connecting branches to mains." July 29.
17,394.—CADMAN, J., "Distillation of coal." July 29.
17,412.—HOOKER, M., "Air-gas apparatus." July 29.
17,430.—GAWTRY, L. B., "Gas-meters." July 29.
17,515.—COUSIN, P., "Heating boilers by gas." July 30.
17,577.—BONECOURT SURFACE COMBUSTION, LIMITED, and EDMUNDS, H., "Combustion of combustible mixtures." July 31.
17,590.—TOOTH, L. F., "Metallurgical and like furnaces." July 31.
17,611.—AARTS, J. G., "Feeding and distribution of charges in vertical retorts." July 31.
17,612.—AARTS, J. G., "Discharging carbonized products obtained in vertical retorts." July 31.
17,617.—MAGNUS, L. A., and CURRIES, N. N., "Acetylene generators." July 31.
17,627.—FRANKS, E. A., "Carbonization of coal." July 31.
17,661.—AARTS, J. G., "Distillation of bituminous matters." Aug. 1.
17,676.—TAPLAY, J. G., "Gas analysis apparatus." Aug. 1.
17,722.—SYKES, H., "Retorts." Aug. 1.
17,739.—MORGAN, J. J., "Determination of the matter in suspension in gases." Aug. 2.
17,757.—TARBOLTON, C. E., "Jointing pieces of pipes" Aug. 2.
17,779.—MOND, E. S., "Absorbing ammonia from producer gas." Aug. 2.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS MANAGER AND ELECTRICAL ENGINEER. Malvern Urban District Council. Applications by Aug. 30.
RESEARCH CHEMIST. Leeds University.
DISTRICT INSPECTOR OF COOKING AND HEATING APPARATUS (Shanghai). Applications to Mr. J. W. Mackay, 14, Redston Road, Hornsey.
TRAVELLER. Lowen, Hartridge, and Co., 36, Aldersgate Street, E.C.

Agencies, &c. (Mantles).

G. P. DROSSBACH & Co., Freiberg, Saxony.

Appointments, &c., Wanted.

SECRETARY AND GENERAL MANAGER. No. 5763.
CHEMICAL PLUMBER. Davies, Galloway Road, Shepherd's Bush, W.
MANAGER (Home or Abroad). No. 5772.
ENGINEERING POSITION (Home or Abroad). No. 5774.

Plant, Books, &c. (Second-Hand), for Sale.

GASHOLDER, &c. J. J. Simpson, Perth.
"JOURNAL" VOLUMES AND GAS TEXT-BOOKS. No. 5766.

Meetings.

BARNET GAS AND WATER COMPANY. Holborn Restaurant. Aug. 29. 12.30 o'clock.
HARROW AND STANMORE GAS COMPANY. Holborn Restaurant. Sept. 1. One o'clock.
RIDDINGS GAS COMPANY. 139, Cannon Street, E.C. Aug. 29. Three o'clock.

TENDERS FOR

Boilers, &c.
CLECKHEATON GAS DEPARTMENT. Tenders by Aug. 20.

Capstan, Bollards, &c.
CLECKHEATON GAS DEPARTMENT. Tenders by Aug. 20.

Coal.
LYMM URBAN DISTRICT COUNCIL. Tenders by Aug. 20.

Coke Breeze.
SWANSEA GAS-WORKS.

Fire Clay Goods.
SHEFFIELD GAS COMPANY. Tenders by Aug. 25.

Fires.
SALFORD GAS DEPARTMENT.

General Stores (Sulphuric Acid, Tinned Ware).
HEYWOOD GAS DEPARTMENT. Tenders by Aug. 19.

Governor.
CLECKHEATON GAS DEPARTMENT. Tenders by Aug. 20.

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[*See Article in* "JOURNAL" *for Oct.* 1, 1912, *p.* 20.]

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